

OFFICIAL COPY.

Mr. T. W. Thompson's Report to the Local Government Board upon an Inspection of certain Valleys in the Counties of Monmouth and Glamorgan, with special reference to Sewerage and Drainage Arrangements, and to the Pollution of Streams.

R. THORNE THORNE,

Medical Officer, 18th August 1896.

IN July 1895, I received instructions to carry out an inspection, which the Board had for some time had in contemplation, of the Valleys of the Rumney, Sirhowy, Ebbw Fawr, Ebbw Fach, and Ebbw Rivers; and somewhat later my inspection was extended, by fresh instructions, to the Valley of the Afon Llwyd. The object of this inspection was to ascertain more precisely the existing state of affairs—already known to be of a generally unsatisfactory character—as regards drainage and sewerage arrangements in these valleys; both in respect of their general suitability to fulfil their purposes, and with special reference to the pollution of streams. It was further understood that I should keep in mind the question as to the best means of remedying such defects of sewerage and of sewage disposal as might be met with.

The results of my inspection are given in the following Report:—

GENERAL REPORT.

Topographical and General Description of the Valleys.—Speaking generally, the valleys in question may be said to extend in a south-easterly direction from the southern slope of the elevated plateaux in the south of Brecknockshire known as the Llangynidr and Pen Cern Mountains. The Sirhowy, Ebbw Fawr, Ebbw Fach, Ebbw, and Afon Llwyd Valleys lie wholly within the county of Monmouth, on its western side, except that for a short distance at their commencement the two former are situate in the county of Brecknock. The Rumney Valley also commences in Brecknockshire, but for the remainder, *i.e.*, almost the whole, of its course, its western side is situate in the county of Glamorgan and its eastern side in that of Monmouth, the Rumney river constituting the boundary between these counties. The Rumney Valley follows an independent course throughout, its river discharging separately into the Severn Estuary at the eastern boundary of the borough of Cardiff. The valleys of the Ebbw Fawr and Ebbw Fach, after each pursuing a separate course for some six or seven miles, unite at Aberberg, by the confluence of their rivers, to form the valley of the main River Ebbw. At Risca, about eight miles further south, the Ebbw Valley is joined by the Sirhowy Valley; the Sirhowy river at this point joining the Ebbw which ultimately discharges into the River Usk close to the confluence of the latter with the Severn. The Afon Llwyd follows an independent course until its river joins the Usk at Caerleon.

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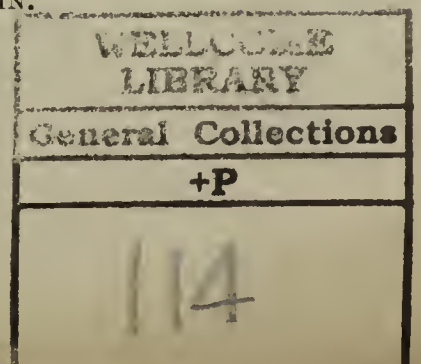
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For a considerable part of their extent the valleys are narrow and flanked by steep mountain ridges, which rise to an elevation, in some localities, of 800 feet or more above the level of the rivers. Towards the south-east, however, below Caerphilly, Risca, and Pontypool, the valleys of the Rumney, Ebbw, and Afon Llwyd, respectively, open out, and the country, though still hilly in places, becomes gradually less so.

Rivers.—The course of the several rivers has been generally indicated in the above account of the valleys, and may be seen by reference to Diagram A. accompanying this Report. They are all rapid and for the most part shallow streams. The approximate length of each is as under :—

The Rumney	-	-	-	-	-	-	29 miles.
The Sirhowy	-	-	-	-	-	-	19 „
The Ebbw Fawr	-	-	-	-	-	-	7 „
The Ebbw Fach	-	-	-	-	-	-	7 „
The Main Ebbw (from Aberberg southward)	-	-	-	-	-	-	15 „
The Afon Llwyd	-	-	-	-	-	-	16 „

Taken together these rivers pass through or along the boundaries of 23 different sanitary districts, the arrangement of these districts in relation to the rivers being, from north to south, as follows :—

THE RUMNEY RIVER.

<i>West Side.</i>	<i>East Side.</i>
Gelligaer, Rural.	Rhymney, Urban.
Caerphilly, Urban.	Bedwellty, Urban.
Llandaff and Dinas Powis, Rural.	St. Mellons, Rural.
Cardiff, Urban.	

THE SIRHOWY RIVER.

<i>West Side.</i>	<i>East Side.</i>
Tredeggar, Urban.	Tredeggar, Urban.
Bedwellty, Urban.	Bedwellty, Urban.
St. Mellons, Rural.	St. Mellons, Rural.
Risca, Urban.	Risca, Urban.

THE EBBW FAWR RIVER (TO ABERBERG).

<i>West Side.</i>	<i>East Side.</i>
Ebbw Vale, Urban.	Ebbw Vale, Urban.
Abercarn, Urban (for short distance at extreme south).	Abertillery, Urban (also for short distance).

THE EBBW FACH RIVER.

<i>West Side.</i>	<i>East Side.</i>
Nantyglo and Blaina, Urban.	Nantyglo and Blaina, Urban.
Abertillery, Urban.	Abertillery, Urban.

THE MAIN RIVER EBBW (BELOW ABERBERG).

<i>West Side.</i>	<i>East Side.</i>
Abercarn, Urban.	Abertillery, Urban.
Risca, Urban.	Abercarn, Urban.
St. Mellons, Rural.	Risca, Urban.
	St. Mellons, Rural.
	Newport, Urban.

THE AFON LLWYD RIVER.

<i>West Side.</i>	<i>East Side.</i>
Blaenavon, Urban.	Blaenavon, Urban.
Abersychan, Urban.	Abersychan, Urban.
Pontypool, Urban.	Pontypool, Urban.
Panteg, Urban.	Panteg, Urban.
Llanfrechfa Upper, Urban.	Pontypool, Rural.
Llantarnam, Urban.	Magor, Rural.
Magor, Rural.	
Caerleon, Urban.	

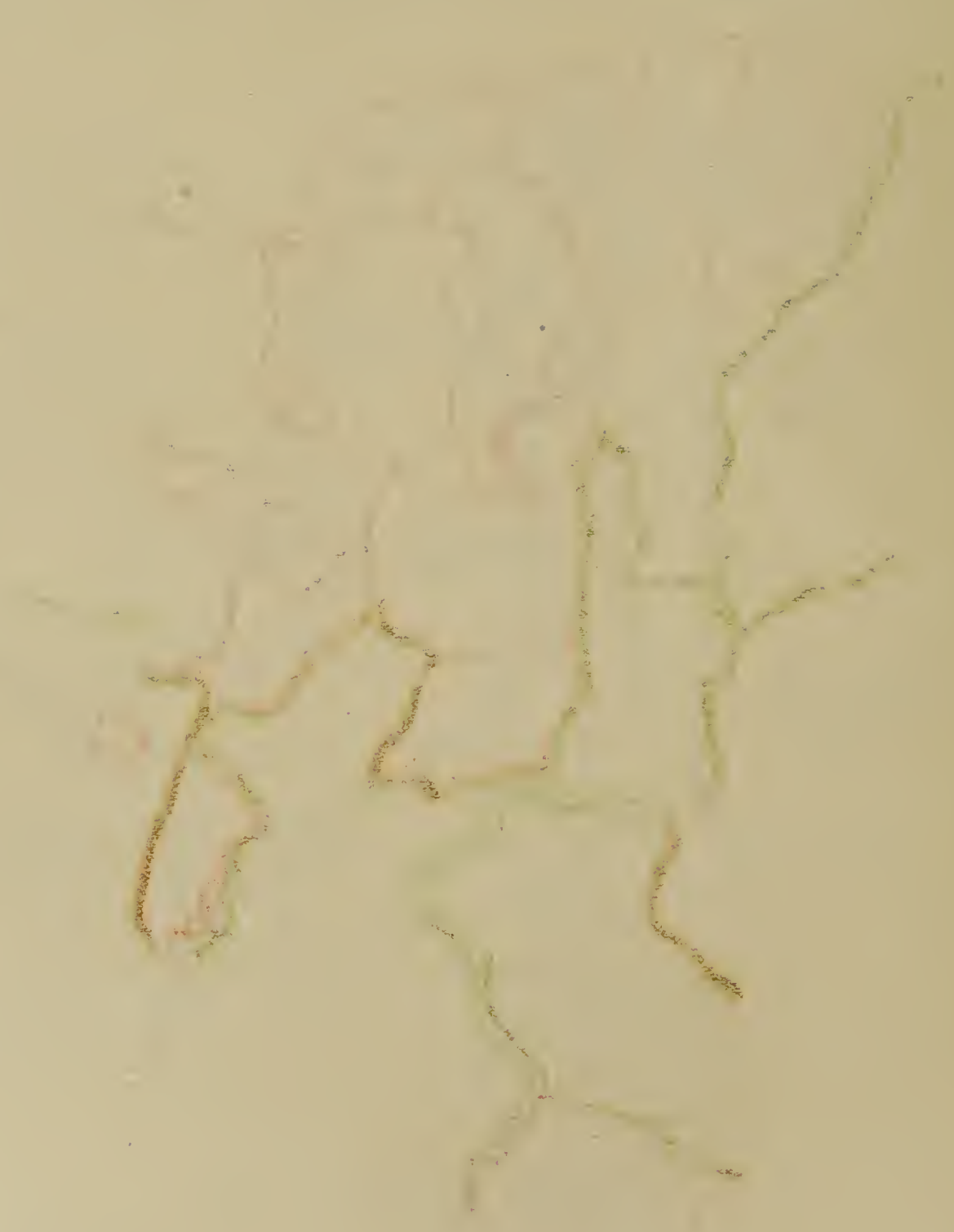


DIAGRAM A.

*Shewing the topographical relations of the several Districts
and Rivers dealt with in Mr. T. W. Thompson's Report.*



Scale: 4 miles to one inch.

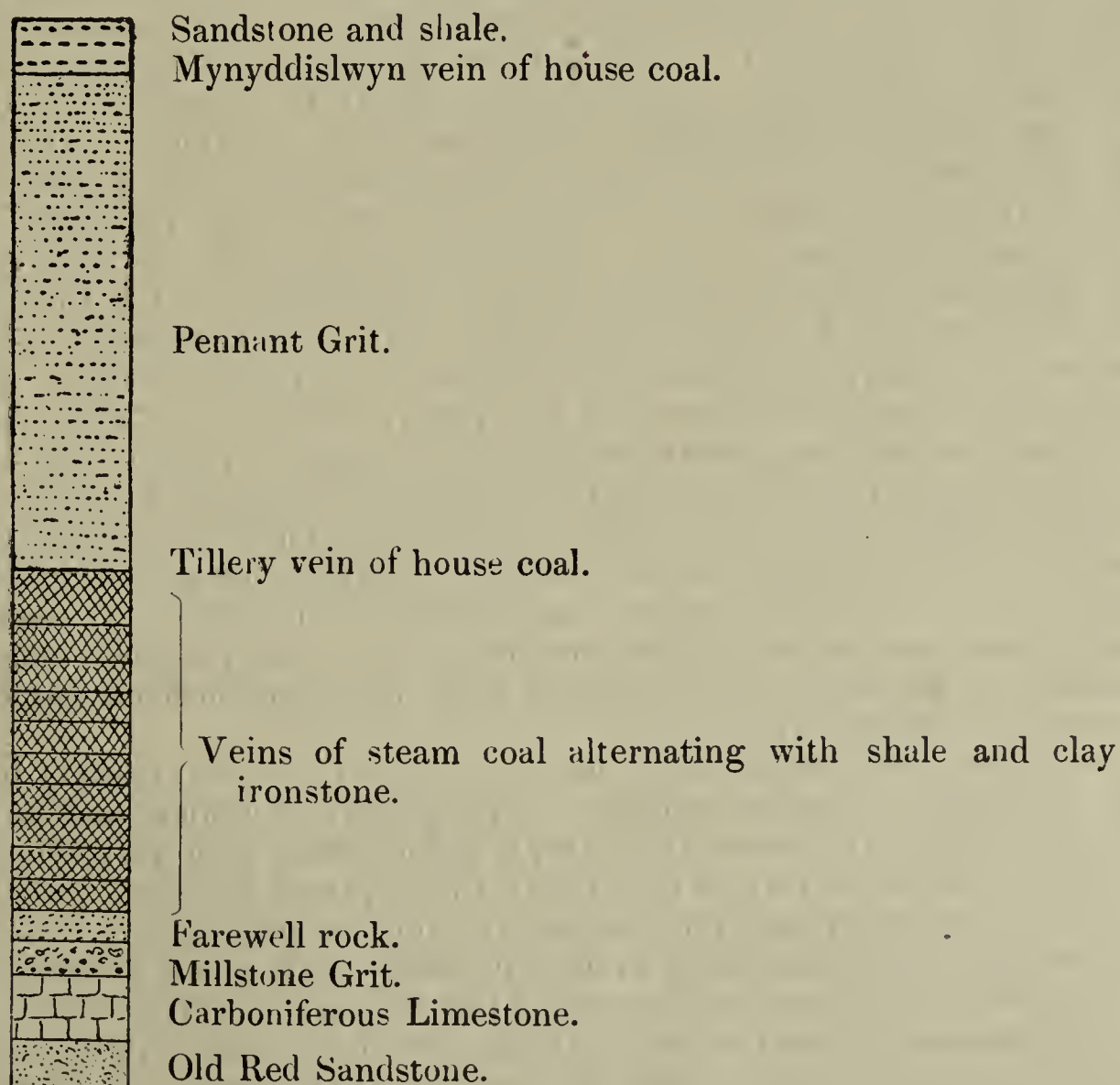


In traversing the above districts the several rivers receive a number of tributary streams, which will be seen, later, to be of considerable importance from the point of view of river pollution. Among the most important of these streams are the Bargoed Rumney and the Aber and Cledr Brooks, which discharge into the Rumney; the Cwm Tillery, which discharges into the Ebbw Fach; the Torlas Brook, which discharges into the main River Ebbw; and the Cwmffrwd, Sychnant, Cwmnantddu, Cwmffrwdroer, Trostant, and Cwmbran Brooks, which discharge into the Afon Llwyd.

Geology.—The geological circumstances of the region under consideration have important bearing upon certain of the questions to be referred to in this Report, and must, therefore, be stated in some detail. The point to be first observed is, of course, the large portion of the region which is situate upon the Coal Measures of the South Wales coalfield. This valuable coalfield extends from Kidwelly in Carmarthenshire, on the west, completely through Glamorganshire and into Monmouthshire as far as the Afon Llwyd Valley, which, roughly, marks its extreme eastern limit. The eastern portion of this coalfield, with which alone I am concerned, extends uninterruptedly from west to east across the Rumney, Sirhowy, Ebbw Fawr, and Ebbw Fach Valleys, to the west side of the Afon Llwyd Valley. From north to south it stretches from a little beyond the Monmouthshire boundary in the north to Risca and Caerphilly in the south, a distance of between 15 and 16 miles. As regards the geology of the remainder of the area covered by these valleys, the limit of the coalfield is everywhere marked by the out-crop of the Millstone Grit and Carboniferous Limestone which underlie the Coal Measures, while the Old Red Sandstone, which lies deeper still, is exposed over nearly the whole remaining portion of the area under consideration.

The general arrangement of the strata in this eastern portion of the coalfield is indicated by the diagram below, which represents a section of the locality known as the Caerphilly Basin.

The strata there comprise from above downwards :



The Rumney, Sirhowy, and the Ebbw Valleys have been carved by their respective rivers through the upper sandstone of the Coal Measures, and for a considerable depth through the Pennant rock. The Afon Llwyd Valley, on the other hand, has been cut between the Pennant rock and the Millstone Grit and Limestone. In the bottoms of the valleys the rock is for the most part completely masked by glacial gravels, varying in character from a clay full of stones to a pebbly gravel, as well as by the washing down of disintegrated rock, shale, and sandstone which, in places, has accumulated to considerable depth, forming alluvial meadows along the sides of the rivers.

With regard to the coal, the Mynyddislwyn vein of house coal, with its overlying sandstone and shale, has long since been extensively removed by denudation, though it still exists in the Caerphilly Basin, and over a considerable area near the centre of the Monmouthshire portion of the coalfield, where it has, however, already been largely worked. But the importance of the coalfield, of course, depends upon the number and value of the deeper seams of steam coal. These seams, which crop out along the north of the coalfield, rapidly become deeper on proceeding southwards, owing to the dip in the strata, and attain in some localities, about the centre and towards the lower part of the coalfield, a depth of over 700 yards. Further south, however, the strata are again raised into an anticlinal ridge, as may be seen from the reappearance of the Millstone Grit and Limestone, and the coal is thus brought nearer to the surface.

Similarly the steam coal comes to the surface along the western side of the Afon Llwyd Valley.

POPULATION AND OCCUPATIONS OF THE PEOPLE.

It will be readily understood that the area to which this Report refers, which may be roughly taken as co-extensive with the Urban and Rural districts enumerated on page 2 (exclusive of the boroughs of Cardiff and Newport and the urban district of Caerleon which are not really within the drainage area under consideration), is, from an industrial point of view, a highly important one, and is already occupied by a large population. According to the census of 1891 the population of the sanitary areas, and parts of sanitary areas, here dealt with then amounted to 175,432, showing an increase of nearly nineteen per cent. upon the census of 1881. These persons, who are mainly engaged in the coal, iron, and allied industries, are distributed chiefly in a number of towns which have arisen in the neighbourhood of past and present workings. It was natural, of course, that in the first instance the coal and ironstone should be worked where they were nearest to the surface, and accordingly the chief centres of population are for the most part situate at or near the circumference of the extensive basin formed by the anticlinal arrangement of the Coal Measures, to which reference has already been made. The chief instances in point are the towns of Rhymney, Tredegar, Ebbw Vale, Nantyglo and Blaina, Blaenavon, Abersychan, Pontypool, Risca, and Caerphilly, where the numerous shale heaps of abandoned workings afford ample evidence that in most of these localities mining, though chiefly of a superficial sort, has been carried on for a very long period. The tendency, however—a tendency which has already manifested itself in several localities—is to extend the workings toward the centre of the basin where the coal lies deeper. As the coal becomes gradually worked out at the surface this tendency will become more pronounced, and new and extensive centres of population will doubtless arise in neighbourhoods which are at present of a rural character.

As regards the present state and prospects of the industries of this region, the iron trade is undoubtedly in a very depressed condition, and not a few of the most important ironworks have, it would seem, been permanently closed. There are doubtless various reasons for this depression. The original development of the important iron industry in this locality was, of course, mainly determined by the abundance of clay ironstone in the coal measures. Owing to the amount of phosphates present in this local ore, however, it is unsuitable for modern methods of steel manufacture, and foreign ore is consequently now almost exclusively used. Hence ironworks situate on the seaboard have advantage over those further inland. In another respect the introduction of steel has indirectly conduced to the depression, temporarily at all events, of the iron trade in this locality. Much of the trade formerly consisted of the manufacture of iron rails,

the average life of which is about four or five years, whereas that of a steel rail appears to be some 15 or more years. Other things being equal this, of course, would considerably diminish the demand for iron rails; but I am further informed that the introduction of steel rails attracted so large an amount of capital to their manufacture that a serious over-production of steel rails ensued. On the whole, the prospects of the iron and steel industries, along the north of these valleys at all events, appear to be generally regarded as far from reassuring. Whether any important development of these trades is likely to occur in the south of the valleys nearer the seaboard is another question. Certainly some nine years ago some large iron and steel works were removed from the Midlands to Rogerstone, in St. Mellons rural district, a few miles north of Newport, and some new blast furnaces have recently been erected at the works of the Patent Nut and Bolt Company in the Llantarnam urban district.

Another important industry in these valleys, the tin-plate trade, is also in a depressed condition, though at the time of my visit there were some signs of its revival; one or two works which had been temporarily closed had just been re-opened. How far the prospects of this industry will be permanently injured by foreign tariff regulations remains to be seen.

The most important industry is, however, of course, coal-mining, the ultimate prospects of which in this region appear to be particularly good. It is true that a considerable amount of the coal has already been worked at the outskirts of the basin where it is nearest the surface; in the Nantyglo and Blaina district, for instance, it is considered by persons whose local knowledge and experience would seem to entitle their opinion to respect, that the coal, at the present rate of working, will be worked out in from 20 to 30 years. A similar estimate was given to me in regard to the coal in the Blaenavon urban district. These, however, are the districts in which the coal has been most extensively worked. On the other hand, it is certain that over the greater part of the eastern region of the South Wales coalfield there is a vast amount of coal still to be worked. This coalfield would indeed appear, as I was informed on very high authority, to be only now being opened up. There are still extensive areas over which the steam coal is at present entirely untouched. Thus in the Rumney Valley the steam coal is intact from Bargoed southwards, including the whole of the Caerphilly basin, except that it has recently been tapped at Llanbradach; a new deep pit is, however, being sunk at Senghenydd. In the Sirhowy Valley the steam coal is untouched throughout the whole of the area within the Bedwellty urban district, and southwards as far as Risca. In the Ebbw Valley there is also a large quantity of steam coal untouched, and it is estimated that in both the Abertillery and Abercarn districts there is coal enough to last 100 years at the present rate of working. Lastly, as regards the Afon Llwyd Valley, there is a large quantity of steam coal to be worked in the Abersychan district, where there are some 2,000 acres in the Cwmffrwdor and Cwmnantddu Valleys still practically untouched.

Upon the whole, it may be safely assumed that these valleys will be the scene of extensive coal-mining operations for very many years to come, and that considerable increase of population may be anticipated in many of those areas which are at present of a rural character.

CONDITION OF THE RIVERS IN REGARD TO POLLUTION.

It may be stated generally that these rivers at present constitute the common sewers of the valleys through which they pass. With but very few exceptions, the 20 sanitary districts, or the parts of those districts* which drain naturally towards one or other of these rivers, discharge into them practically the whole of their slop-sewage; and inasmuch as the majority of these districts have more or less completely adopted some form of water carriage for the disposal of excrement, the rivers also receive a vast quantity of excremental sewage. But in addition to pollution by sewage, these rivers are also subject to serious pollution by waste

* In most instances practically the whole of the districts. The remaining three of the 23 districts shown on page 2, viz., the Cardiff, Newport, and Caerleon urban districts, though slightly abutting upon one or other of the rivers in question, contribute but little, or not at all, to the pollution of these rivers, since their populous areas drain naturally either into the Severn or the Usk, and therefore hardly come within the scope of this inquiry.

trade products, and to some extent also by ashes and other refuse tipped upon their banks. In regard both of trade pollution and pollution by ash-tipping it is, however, satisfactory to be able to state that measures have in not a few instances been recently adopted, as a result of the action of the Monmouthshire and Glamorganshire County Councils, to diminish the illegal fouling of streams by these means. The trade pollution consists of liquid refuse from the ordinary trade processes incident to towns and villages, such as refuse from slaughterhouses, breweries, fellmongers' yards, and gasworks. There are, however, in these valleys certain other very important sources of river pollution, the chief of which are connected with the coal-mining and tin-plating industries so extensively carried on there. There are also one or two chemical works, one galvanising works, and several large brick and tile works.

The pollution of the rivers which results from colliery operations is mostly connected with coal-washing, a process sometimes adopted with a view to rendering small coal more saleable, but most frequently with the object of separating the very fine coal from the fine shale with which it is mixed, for the purpose of utilising the former in the manufacture of coke. The employment of water with the latter object is based upon the fact of the coal being lighter than the shale, whence it follows that when the two are floated together down inclined troughs in water kept in lateral agitation, the shale, or "dirt," as it is technically called, sinks to the bottom, and by special arrangement is carried off into one set of hoppers, while the fine coal floats over the end of the troughs and is collected elsewhere in subsidence in tanks. After the subsidence of the fine coal in this wise, however, the waste water still contains a quantity of yet finer coal in suspension, which if passed with the waste water into the river, not only gives rise to serious pollution of the stream, but involves also considerable waste of coal-dust of a kind suitable for coke-making. At many collieries, therefore, measures of varying efficiency are adopted with the double object of recovering the fine coal in question, and of diminishing the polluting quality of the waste water when ultimately discharged into the river. These measures consist, firstly, of using the same water again and again for the washery, whereby more and more coal and shale are extracted from it, and the ultimate amount of water to be dealt with is considerably reduced; and secondly, in providing special subsiding tanks into which this water is finally allowed to stand for some hours before being discharged into the river, the resulting deposit of coal-dust being then removed from the tanks for coke-making. In this way a large quantity of coal suitable for coking purposes is recovered from the waste water. At one washery I was informed that 50 tons of usable coal, which would otherwise go into the river, are thus recovered each week. There is obviously great advantage in repeatedly using the same water in the washery. Where this is not done the amount of water continuously running to waste is so large—in the case of one washery visited by me 20,000 gallons per hour—that any serious attempt to deal with it by the older method of mere subsidence would involve the provision of enormous tank accommodation, notwithstanding which, serious pollution of the river and waste of coal might result.

Pollution of the rivers by tin-plate and by galvanising works is due to the discharge into them from these businesses of the "waste pickle." This pickle consists of dilute acid, usually sulphuric acid in the case of tin-plate works and hydrochloric acid at galvanising works, in which the iron plates are steeped in preparation for receiving the tin or zinc respectively. The waste pickle contains a considerable quantity of acid, some two-thirds of which, probably, are in combination with iron, and the remaining third free. The usual method of disposing of the waste pickle of tin-plate works, where avoidance of river pollution is aimed at, is by boiling it down in lead-lined tanks and subsequently crystallising out the sulphate of iron, or copperas, which it contains. This process is of course not applicable where hydrochloric acid is used, as in galvanising, and the waste pickle has to be neutralised by passing it over limestone before it is allowed to flow into the river.

From what has been said it will be understood that the rivers in question are in an extremely foul condition, and that they are liable in hot weather to become very offensive, especially in their upper reaches, where in dry seasons they dwindle to insignificant streams. The Rumney, for instance, as it passes the town of Rhymney, is said to contain little,

at such times, but sewage, and much the same is said to be the case with regard to the Sirhowy at Tredegar. Moreover, notwithstanding the measures recently taken with a view to limiting trade pollutions, these rivers are still much discoloured. They are usually, for a considerable part of their course, either almost or quite black, as a consequence mainly of pollution from collieries, or are of a colour varying from greyish yellow to dirty orange, as a result chiefly of pollution from tin-plate and iron works. In these respects there are, of course, some little differences between the several rivers, and also between the several parts of each river considered separately. Judged by their colour, the Afon Llwyd and Ebbw Fach show most indication of chemical pollution of the kinds referred to, while the Ebbw Fawr and Sirhowy afford most evidence of pollution by coal-dust. On the whole the Rumney River exhibits rather less indication of trade pollution than the others, though all are much discoloured. It should, however, be mentioned that the orange discoloration referred to is, no doubt, contributed to by ferruginous springs issuing from the Coal Measures, usually through abandoned colliery workings. Springs of this kind, sometimes of a deep orange colour, may be seen entering the rivers in different localities. Apart from the colour of the water, evidence of trade pollution is also furnished by the coal-dust, and sometimes by glistening particles of metal, which may be seen on the banks of the rivers. In some localities considerable silting up of the river beds by coal and shale dust has occurred, and as a consequence of final subsidence of such *débris*, the discoloration of the rivers is, in the lower reaches, less marked.

That pollution of the rivers has increased of late years is evident from the fact of the disappearance of fish in localities where they were freely caught some 20 years ago. In the course of my inspections I heard of trout being still occasionally caught in the Rumney as high as Maesycwmmmer, and in the Ebbw River within the Risca district about the confluence of the Sirhowy and Ebbw Rivers. The systematic use of water from these rivers for drinking purposes, such as that referred to by the late Mr. Netten Radcliffe, who in 1878 described some of the inhabitants of the Tredegar Urban District as having recourse to the stream of the Sirhowy, appears to have been abandoned; and indeed it is difficult, in view of the appearance of this river, to conceive of anyone thinking of drinking water therefrom, though I was informed that school children still occasionally drink water from the Rumney in one locality in the lower part of its course.

THE RIVER RUMNEY.

Pollution by Sewage.—This river is seriously polluted by sewage, most conspicuously so by the districts abutting upon its eastern bank; some attempt has at least been made by the authorities on the west or Glamorganshire side to dispose of their sewage otherwise than by turning it crude into the river. Thus, upon its eastern side the river receives, in the Rhymney Urban District, practically the whole of the “untreated” sewage, which consists mainly of slop sewage (though also of some excremental sewage), brewery refuse, and slaughterhouse drainage; in the Bedwellty Urban District, the whole of the sewage (including most of the excrement) of the towns of New Tredegar and Elliot Town, a quantity of slop sewage from Cwmsiflog, and the slop sewage of the villages of Aber Bargoed and Pengam; and in the St. Mellons Rural District, most of the slop sewage of Maesycwmmmer, Bedwas, and Machen, as well as the slop sewage from various hamlets and scattered cottages. On its eastern side, therefore, this river receives the slop sewage of a very considerable population, and, in addition, a not inconsiderable quantity of excremental sewage. From the western side it habitually receives some “untreated” sewage from Pontlottyn (Gelligaer Rural District), though most of the sewage from this mining village is treated by irrigation on grass land; occasionally, at all events, it receives sewage (including excrement) from the mining villages of Tyr Phil and Brithdir (Gelligaer Rural District)—for although special arrangements have been made for distributing this sewage over grass land before allowing it to find its way into the river, at the time of my visit practically the whole of the sewage from the former village, and some of that from the latter, was going direct into the river without being so distributed; a considerable quantity of slop sewage from the large village of Bargoed (population, some

2,000, Gelligaer Rural District), though in its course along an overgrown ditch this sewage becomes somewhat clarified; some slop sewage from Llanbradach (Caerphilly Urban District), though with a view to avoiding pollution of the river, most of the sewage from this new mining village is discharged into large cesspools, pending the carrying out of a complete sewage scheme. In addition to the above, the Rumney receives, on its western side, a certain amount of slop sewage from different hamlets, such as Hengoed and Ystrad Mynach (Gelligaer Rural District), and from scattered dwellings, and as well a large quantity of sewage brought to it by the following tributaries:—The Bargoed Rumney, in the Gelligaer Rural District, which brings sewage (including some excrement) from the village of Fochrhiw (population, 805) in that district; the Aber Brook and the Cledr Brook, both in the Caerphilly Urban District, the former of which conveys to it the sewage of the new and rapidly-growing mining village of Senghenydd, while the latter brings the sewage of the town of Caerphilly.

Trade Pollution.—The Rumney receives a certain amount of pollution from minor trade processes, such as brewing, fellmongering, and slaughtering of cattle, but the most important polluting trade processes are coal-washing and tin-plate working. These processes are not, however, at present, carried out on a large scale in the Rumney Valley; coal-washing appears to be carried out only in two localities, viz., at Brithdir (Gelligaer District), by the Powell Dyffryn Coal Company, and at Llanbradach (Caerphilly District). At Brithdir the washing is accomplished by a modern Belgian “washery,” erected at considerable cost. By this method the water employed in the process is used again and again, and is ultimately discharged into a large tank, where the suspended detritus is allowed to settle before the water is discharged into the river. Nothing was being discharged into the river at the time of my visit, and I am therefore unable to speak as to the character of the effluent from this tank. Owing, however, to the character of the plant and the procedure adopted, it would not seem likely that the pollution caused by coal-washing at Brithdir is of a very serious character as compared with what occurs elsewhere. At Llanbradach, on the other hand, the methods adopted are far less satisfactory. The water, which is pumped from the pit, is not used repeatedly, but is passed continuously, to the extent of 20,000 gallons an hour, through the washer, which it leaves, carrying with it a large quantity of coal and shale; it is then rapidly passed through a “settling” tank, measuring $31' \times 3'2'' \times 5'$, and thence to a water-course leading to the river. At the time of my visit this tank was practically full of deposit, over which the waste water from the washer was running, the effluent being as black as ink.

The only tin-plate works at present working in the Rumney Valley are the Waterloo works at Rudry in the Llandaff and Dinas-Powis Rural District. These works were not actually in operation at the time of my visit. Boiling and settling tanks have, however, been provided, to which, I was informed, all the waste acid from the pickle-tubs is pumped for use in the manufacture of copperas. The effluent from the settling tanks is, it was said, used again and again until it is all evaporated by boiling, or converted into copperas.

At Maesycwmmmer, in the St. Mellons Rural District, there are some pyroligneous acid works which drain into a tributary of the River Rumney. At the time of my visit, however, I did not find evidence of any notable pollution from this source.

THE RIVER SIRHOWY.

Sewage Pollution.—The most serious pollution of the Sirhowy River by sewage is that which occurs in the Urban District of Tredegar, where the slop sewage of a population of some 18,000 persons, and a considerable share of their excremental sewage, are poured, without any attempt at purification, into the stream. Lower down the river also receives, either directly or indirectly through tributary streams, most of the crude slop sewage of the villages of Hollybush, Argoed, and Blackwood, in the Bedwellty Urban District, and some of the slop sewage from various villages and scattered groups of dwellings in the St. Mellons Rural District, especially Cwmcwrwg, Woodfield, Gelligroes, and Pont Llanfraith, though in this rural district some attempt has been made to limit pollution of the river by the use of cesspools for the disposal of slop sewage.

Trade Pollution.—There are no tin-plate works in this valley, or other works likely to cause serious chemical pollution. Coal-washing is practised at Tytrist and Sirhowy collieries in the Tredegar Urban District. At the former the Belgian process is in use, at the latter a less efficient method.

THE RIVER EBBW FAWR.

Pollution by Sewage.—Except in the case of certain parts of Beaufort it may be said that practically the whole of the liquid sewage from the Urban District of Ebbw Vale, which has a population of some 17,000 persons, is discharged into this river without any attempt at purification, either directly or indirectly by way of brooks or “feeders.” Owing to the general adoption of pail or “box” closets in this district, only a comparatively small proportion of the excrement finds its way into the river, which is, however, very seriously polluted by the slop sewage.

Trade Pollution.—Coal-washing is carried on at Nos. 5 and 22 Pits, Ebbw Vale, and the river is considerably polluted thereby. At the time of my visit the effluent had the appearance of ink, and the river below was on each of the several occasions upon which I saw it almost as black.

THE RIVER EBBW FACH.

Pollution by Sewage.—This river is very seriously polluted by sewage, no attempt having as yet been made with a view to the treatment of the sewage of the considerable aggregations of population situated upon its banks or upon the banks of its important tributary, the Cwm Tillery. It receives at its very commencement the sewage of a portion of Beaufort Hill in the Ebbw Vale Urban District, and that from some 30 houses in the Brynmawr (Brecknockshire) Urban District, which in each instance obtains access to it indirectly by passing through the Trade Reservoirs at its head. Later it receives practically the whole of the sewage (including excrement) of the Nantyglo and Blaina Urban District (population 12,000), which is discharged into it by some 20 outfalls. And finally, it receives practically all the sewage of the Abertillery Urban District (population 9,000), part of which is discharged into it directly and part indirectly through the Cwm Tillery Brook, which joins the river in the Abertillery District.

Trade Pollution.—This is also of a very serious character. Coal-washing is carried on in the Nantyglo and Blaina District at Stories Pit, and in the Abertillery District at the Cwm Tillery Pit. At the former one tank has been provided, and at the latter, four, with a view to recovering some of the fine coal from the “washery” waste water. In neither case, however, did the result appear to me to be satisfactory, the effluent, which in both instances finds its way indirectly into the Ebbw Fach, being at the time of my visit in each case very black. The river is also seriously polluted by waste acid from the Lion Tin-plate Works at Nantyglo, from the Blaina Tin-plate Works at Blaina, and from the Abertillery Tin-plate Works, at none of which works had copperas plant been provided.

THE (MAIN) RIVER EBBW.

This river, after receiving the grossly polluted waters of the Ebbw Fawr and Ebbw Fach, is further seriously polluted on its course of some thirteen miles to the Usk Estuary. On its way from Aberberg to Crumlin it receives the whole of the “untreated” sewage of the colliery villages of Caesimoth, a group of some 90 houses, and of Llanhilleth, some 250 houses, in the Abertillery Urban District. Lower down it receives in succession most of the slop sewage of the Abercarn Urban District, either directly or through the Cwm Torlas Brook, a grossly polluted stream; of the Risca Urban District; and of the villages of Rogerstone, Bassaleg, and Pentrepoeth, in the St. Mellons Rural District. At the Pontymister Tin-plate Works, in the Risca District, copperas plant has recently been provided for recovering the waste acid from the pickle-tub-, which formerly constituted the most serious source of trade pollution of this part of the river. Coal-washing is carried out at the Upper Abercarn Pit, but tanks have been provided in which the waste water, after having been repeatedly used, is allowed to stand for 36 hours before being passed into the river.

THE RIVER AFON LLWYD.

Sewage Pollution.—This river receives practically the slop sewage, and most of the excrement of the Blaenavon Urban District (population 11,000); of the Abersychan Urban District (population 15,000); and of the Pontypool Urban District (population 6,000). To a less extent it receives sewage from the Panteg Urban District (Cwm Ynys-cow and Pontymoile); from the Llanfrechfa Upper Urban District (Upper Cwmbran); from the Llantarnam Urban District (Forge Hammer Division, and part of the Glencoed Division); from the Pontypool Rural District (part of); and from the Magor Rural and the Caerleon Urban Districts. As regards the Panteg, Llanfrechfa Upper, and Llantarnam Urban Districts, however, arrangements have been made, though of an imperfect character, for dealing with most of the sewage upon land. At the time of my visit most of the sewage at one of the principal outfalls in the Llantarnam District was flowing by way of a ditch to the Cwmbran Brook, a tributary of the Afon Llwyd, instead of over the land.

Trade Pollution.—Coal-washing is carried on extensively at the Blaenavon Company's Washery at Blaenavon, at the Varteg Colliery in the Abersychan Urban District, and at the Cwmbran Colliery in the Llanfrechfa Upper Urban District. In all these instances settling tanks have been provided for recovering a portion of the coal dust from the waste water from the "washeries." The arrangements for limiting the pollution of the river from this cause are least satisfactory at the Cwmbran Colliery, where the waste water from the washery is not used a second time, but is passed continuously away through one of the subsiding tanks. At the time of my visit the tank in use was full of deposit, and the waste water was merely running over its surface, thus undergoing but little, if any, purification. At that date tin-plating was carried on in the Afon Llwyd Valley at the Town Forge at Pontypool; at the Pontrhydyrun Tin-plate Works at Pontrhydyrun in the Panteg Urban District; at the Tynewydd Tin-plate Works, and the Avondale Tin-plate Works, both at Pontnewydd in the Llanfrechfa Upper Urban District; and at the Caerleon Tin-plate Works in the Magor Rural District. There are several other tin-plate works within the valley, as the Osborne Forge Tin-plate Works in the Abersychan Urban District; the Panteg Tin-plate Works and the Pontymoile Tin-plate Works, both in the Panteg Urban District. These were, however, closed at the time of my visit. In addition to tin-plate works, there are some galvanising works near Pontymoile, in the Panteg Urban District, at which sulphuric and hydrochloric acids are used in pickling the plates. At the Pontrhydyrun Works, and at the Avondale Works, the waste acid from the pickle-tubs was being allowed to find its way into the river from the former directly, from the latter by way of the Upper Cwmbran Brook. At the Pontrhydyrun Works, however, copperas tanks had recently been provided, and would, I was informed, be used for the future. The waste hydrochloric acid from the galvanising works at Pontymoile was, I found, being passed over limestone in a small tank, though but little of the waste liquor was coming into contact with the limestone. At the Tynewydd Works, and the Caerleon Works, copperas tanks had been provided, and at the Pontypool Town Forge the waste pickle is stored in tanks, and, as I was informed, sent away to copperas works elsewhere. The waste water from the swilling tanks is, however, at these works passed directly into the river, and at the Tynewydd Works into the Upper Cwmbran Brook.

GENERAL REMARKS UPON SEWERAGE AND DRAINAGE.

As will appear from the more detailed accounts of the sanitary circumstances of the several urban and rural districts situate in these valleys, which are appended to this Report, the arrangements in regard to sewerage and drainage are, speaking generally, of a most unsatisfactory character. This is most conspicuously the case in the older towns and villages, many of which still depend mainly upon old stone or brick culverts and box-drains put down many years ago, usually by the owners of the collieries or ironworks which gave rise to the towns in question. These old "sewers" are for the most part unprovided with proper provision for ventilation and flushing, and although, owing to the topographical features of the districts, they have in many cases

steep gradients, the foul character of the sewage issuing from them leaves little doubt that in not a few cases they admit of deposit with resulting decomposition of their contents. Frequently, moreover, they pass under dwellings, and in view of their character and the absence of concrete under the houses, there can be little doubt that in such cases sewer-air finds its way into the dwellings in question. More modern extensions of sewerage and the sewerage of newer aggregations of dwellings have certainly been carried out with glazed socketed pipes, but in many instances even these sewers are very imperfectly ventilated. These newer sewers have, moreover, frequently been put down by property owners, sometimes without proper supervision by the local authority, and in some cases the work has certainly been very badly done. Thus, in one instance I met with a pipe sewer, recently put down on an important estate, the pipes of which were for a considerable distance so superficially laid that their crowns were visible above the ground, and they were in several instances broken. The fall was irregular, and the house drains, which were taken into this sewer at right angles, had been connected by the simple process of knocking a hole in the sewer. It is not, of course, suggested that this is a fair sample of the modern sewer in these districts, some of which are apparently well constructed, and I have only quoted it as indicating the need for adequate supervision of the laying of sewers by property owners, a need which I found had in other instances been ignored.

Like the sewerage, the house drainage is also in very many localities of a faulty and unsuitable character. Old box-drains, defective open channels for slop waters, and untrapped yard sinks are still far from uncommon. And although the large majority of such sinks are trapped, this is most frequently accomplished by that objectionable form of trap, the iron "lip-trap," instead of by a proper self-cleansing gulley. These lip-traps are objectionable both on the score of their acting as receptacles for decomposing filth, as small cesspools in fact, and also for the reason that they are mostly so imperfectly fixed that they may be easily removed, as in practice they frequently are.

EXCREMENT AND REFUSE DISPOSAL.

In regard to the larger towns and mining villages, the mode of excrement disposal which has most commonly been adopted for newer dwellings, and in substitution for the old cesspit privies of old dwellings (in so far as such substitution has been brought about), is a form of water carriage consisting of pan and siphon closets, sometimes of the "long" and sometimes of the "short" hopper pattern. Such closets are, however, almost invariably unprovided with any water supply, and are thus dependent for cleansing upon hand-flushing, with a result that is often far from satisfactory. These pan and siphon closets are, however, a vast improvement upon the cesspit privies, and if the selection of suitably-shaped short hopper-pans were more generally encouraged and the closets provided with proper flushing cisterns, the system would leave little to be desired. As will be seen later, however, the want of a more plentiful water supply stands in the way of the adoption of flushing cisterns in not a few of the districts.

But in certain districts, where the kind of water carriage above referred to has been adopted, the pan closets are not invariably provided with siphon traps--of course a most serious omission. Then in the Blaenavon Urban District a number of iron pan closets directly connected with the drains were met with. In other districts concrete hopper closets, also untrapped, were found; closets which, in addition to being directly connected with the drain, become almost of necessity coated in their interior with excremental filth. In the Ebbw Vale Urban District "dry ash closets" have been extensively introduced in supersession of privies. These ash closets, which are scavenged by the Urban District Council's contractor, consist of iron boxes, and are mostly provided with arrangements for sifting cinders; a provision which the Council have, however, recently ceased to require. In not a few instances the iron boxes were found to be missing, with the result that the portion of the closet in which the box originally stood had come to be used as a fixed receptacle for excrement, a function it was not constructed to serve.

A varying number of old cesspit privies still exist in most of the older towns, and are in common use in many of the smaller villages and more rural

parts of the district. The cleansing of these privies is mostly left to occupiers. But though in some of the country villages the houses are provided with large gardens wherein the privy contents may be utilised, this is by no means invariably the case. Owing to their construction, position, or want of proper cleansing, many of the old privies are productive of serious nuisance. In some rural localities the substitution of pail-closets for old privies has been more or less extensively brought about; a substitution which is, as a rule, especially where supplemented by arrangements for scavenging the pails, attended with manifest advantage.

As regards the disposal of ashes and house-refuse, this is very properly undertaken by the District Councils, usually under contract, in most of the larger centres of population, a daily removal of such refuse being arranged for in many of the towns. In the smaller villages open iron ashbins are in many cases provided at certain points by the District Councils, who also undertake or contract for the removal of refuse therefrom; such ashbins are, however, for the most part provided in insufficient numbers, and owing to this cause, or to the absence of any suitable accommodation of the kind, ashes and house refuse may be seen lying about in the vicinity of dwellings and in public places. Such matters are often, moreover, when circumstances are favourable, thrown into the rivers or tributary streams.

WATER SUPPLY.

The Urban Districts of Tredegar, Ebbw Vale, Nantyglo and Blaina, and Abertillery are now, it would appear, sufficiently provided with water, from mountain springs and gathering grounds. As a general rule, however, the water supplies of the towns and villages in the several valleys appear to be unsatisfactory, especially as regards quantity.

CONSIDERATIONS IN REGARD TO THE PREVENTION OF THE POLLUTION OF THE RIVERS.

From the facts I have recorded it will have become evident that the pollution by sewage of the rivers in question is of a most serious character; and it can hardly be doubted as regards the western rivers at all events, *i.e.*, the Ebbw, Sirhowy, and Rumney, that this pollution, unless adequate measures are taken with regard to the purification of sewage, will steadily increase with the increase of population which must inevitably accompany the development of the coal industry in the several valleys concerned. The need for action in the matter appeared to me indeed to be fully recognised by not a few of the local authorities, several of whom have already schemes under consideration for dealing with the sewage of their respective districts. Thus the Caerphilly Urban District Council have prepared a scheme of main sewerage for their district and are awaiting the confirmation by Parliament of a Provisional Order which has been granted them by the Board for the compulsory purchase of land for the purposes of sewage disposal; the Urban District Councils of Abercarn and Risca have also a joint scheme under consideration for the sewerage of their districts to one outfall below Risca where it is proposed to deal with the sewage on land. The question of a joint scheme of sewerage and sewage disposal for the Abersychan, Pontypool, and Panteg Urban Districts has also been under consideration, though the matter appeared at the time of my visit to be at a standstill. I was, further, assured by representatives of some of the other District Councils that they quite admitted the need for action in this matter. I regret, however, to say there is apparently still a strong disinclination on the part of the Councils of certain Urban Districts situate at the heads of the valleys, districts which are especially in need of improved sewerage and are among the most serious offenders as regards river pollution, to adopt any suitable measures of sewerage and of sewage disposal.

But, granted the need for action in the matter, a need which I think would be admitted by any independent person who visited the valleys under consideration, the question arises as to the best means of remedying the existing unsatisfactory state of affairs. Two possible courses suggest themselves.

1. The execution of works of main sewerage and of sewage disposal by the various District Councils, each acting independently of the others, or, in particular cases, as dictated by topographical and other circumstances, by two or more districts combining in a joint scheme or schemes.

2. Joint schemes of larger character, comprising main trunk sewers extending throughout the whole length of the several valleys. A scheme of this latter character has been already suggested by the Monmouth County Surveyor, who proposed to carry main trunk sewers down the Sirhowy, Ebbw Fawr, Ebbw Fach, and Afon Llwyd Valleys to a common outfall sewer commencing at Bassaleg and discharging into the Severn estuary at low-water mark near Peterstone. The Rumney Valley might in such case be dealt with in a similar manner either independently or by junction with the main outfall sewer in question.

With respect to all or any such schemes, it will be evident that, as regards the cleansing of the rivers, success will be dependent upon the adoption of sewage purification by all of the numerous districts naturally draining towards them. And this is practically admitted locally, since the authorities of districts situate in the lower part of the valleys have already on various occasions in correspondence with the Board ascribed their disinclination to undertake sewerage works to the unsatisfactory results which would follow the purification of the sewage of certain districts, if no steps were taken with regard to the purification of that of others.

But not only is the adoption of measures of sewage purification by all the District Councils concerned essential to success, but the measures must be equally adequate, not only as regards original conception and execution, but as regards subsequent management. Now the multiplication of outfall works would almost certainly result in considerable diversity of efficiency, especially as regards their practical working in the future.

In regard to the feasibility of cleansing these rivers of sewage by the independent action of individual districts, however, a more serious difficulty arises. The valleys are in many places steep and narrow, and, although there is a certain amount of alluvial meadow land irregularly distributed alongside their streams, this varies considerably, both in amount and as regards suitability of soil, in different localities. Some of the districts, indeed, as the Pontypool, Abersychan, Abercarn, and Risca Urban Districts, appear to possess no suitable land within their own areas to which their sewage could be conveyed by gravitation for the purposes of purification; and to these may, I think, be added the Abertillery Urban District. I am not, however, prepared to say that sufficient land might not be found in these valleys for disposal of sewage on the principle of independent action by the various authorities concerned, if judicious grouping together of districts for sewerage purposes superseded this principle when local circumstances demanded such grouping; though this is, of course, a matter which could only be definitely decided by a detailed engineering survey of the valleys. Such a method of dealing with the matter would, however, in any case involve a multiplicity of outfall works; sometimes, in all probability, two or more such works for the disposal of the sewage of a single district. And even under these circumstances many of the numerous hamlets and scattered dwellings would be left unprovided for in this respect. Moreover, if designed mainly with a view to dealing with the sewage of existing towns and villages, this plan would be likely to fail in making provision for the needs of those portions of the valleys which, although at present sparsely populated, seem, owing to their richness in steam coal, to be destined in the future to become important centres of industry. Independent action would not, therefore, give promise of permanent remedy against pollution of the rivers by sewage. The extreme rapidity with which large colliery villages may spring up in the neighbourhood of new deep pits is now being illustrated at Llanbradach and Senghenydd, in the Caerphilly Urban District, and unless some provision for sewage disposal is made in advance it is in a high degree probable that some of the aggregations of population which will rapidly appear in the vicinity of future pit sinkings may, owing to physical circumstances, find it difficult to dispose of their sewage otherwise than by turning it into the river.

An adequate system of main trunk sewers for the several valleys would, on the other hand, be free from all the above objections. By providing at once for

the conveyance of all sewage to the Severn estuary from existing and future centres of population it would completely and permanently cleanse the rivers of sewage. In the course of my visits to the different districts I found that such a scheme was regarded by many persons as the proper solution of the difficulty, though various objections to it were raised by others. The chief grounds of objection brought to my notice were expense; the possibility of some better method of sewage disposal than now exists being discovered in the near future which might obviate the need for so large an expenditure; the probable disorganisation from time to time of the system by fracture of the main sewers owing to subsidence from undermining; and the likelihood of nuisance being caused to the inhabitants of Newport, Cardiff, and Penarth by the discharge of so large a volume of sewage into the Severn estuary. Objections of this sort appear, indeed, to have formed the grounds upon which the Monmouthshire County Council abstained from urging the adoption of their County Surveyor's scheme.

In regard to expense, the Monmouthshire County Surveyor (Appendix No. VII.) estimates the cost of a system of main trunk sewers for the valleys of the Sirhowy, Ebbw Fawr, Ebbw Fach, and Afon Llwyd at £.200,000, which if borrowed at $3\frac{1}{2}$ per cent. repayable in 30 years would, he calculates, entail, for repayment of principal and payment of interest, a 6*d.* rate upon the valleys in question, or if repayable in 50 years a rate of $4\frac{1}{2}$ *d.* It may well be doubted whether the construction of a series of main sewers and multiple outfall works for the various districts concerned, including the purchase of land for sewage disposal purposes, would not involve an even larger expenditure, especially in view of the probable perpetual cost in connection with the disposal of sewage. For it has to be remembered that the question is not as to the absolute, but as to the relative cost of the two systems. It would probably not be very unsafe to hazard a similar reply to the objection which is based upon possible future developments in the economics of sewage disposal, for there would seem no reasonable prospect of such developments removing the need for main sewers to convey the sewage to one outfall in each district for treatment. And such sewers do not at present exist. Moreover, this argument as to the future possibilities of discovery might, of course, be urged against all progress. The objection with respect to possible fracture of main trunk sewers is a more reasonable one, and one doubtless requiring the careful consideration of engineers. Up to the present time there would not appear to have been much subsidence from undermining along the lines of these rivers, except in one or two of the districts where the coal has been most extensively worked. Evidence of actual sinking of the bed of the river, indeed, I met with in only one district, that of Nantyglo and Blaina. In that locality there has been considerable subsidence, as a consequence of which the course of the river became so diverted as to partially submerge a tennis ground. And there can be little doubt that in time to come, when the steam coal has been extensively worked, subsidences will occur lower down the river. Such may not occur on any important scale for many years to come, and owing to the great depth of the coal seams in the basin of these coalfields it will doubtless be of a more general nature, and thus of a less troublesome character than the frequently recurring subsidences over small areas when the mining operations are carried on nearer the surface. In certain localities, where the beds of the rivers are crossed by "faults" in the Coal Measures,—such as the Glyn fault at Newbridge, which crosses the bed of the Ebbw, the Llanfabon fault, which crosses the Rumney north of Llanbradach, and the fault which crosses the Sirhowy at Gelligroes,—it is, of course, likely that subsidences will be sharply defined as the coal will almost certainly be worked out on one side of the "fault" before the other. This is, of course, a matter to be taken into consideration, and it is a question, of course, for engineers as to how the not improbable inconvenience from future sinkings of the kind in question can be overcome by engineering contrivance. It must be remembered, however, that possible inconvenience of the kind in question must not be regarded as exclusively appertaining to main tunnel sewers. It is, indeed, a possible inconvenience that would have to be faced in connection with a system of independent main sewers for the several districts concerned. The question has but little bearing in regard to the Afon Llwyd, since south of the Blaenavon Urban District that river lies, for most of its course, outside the eastern limits of the coalfield.

With regard to the likelihood of nuisance resulting from the discharge of sewage into the Severn estuary, this would appear a somewhat remote possibility having regard to the enormous dilution the sewage would undergo. In this connection I may mention that from inquiries I made it would not appear that any nuisance of the kind has been experienced from the Rhonda Valley outfall. If necessary, however, some "treatment" of the sewage at the outfall prior to its discharge into the Severn might be adopted, though this would, of course, add to the cost of the scheme.

In regard to the question of main trunk sewers, it should, perhaps, be mentioned that in some of the districts at the head of the valleys, notably the Nantyglo and Blaina Urban District, the river has been culverted in certain localities and covered by railway sidings and slag heaps. It would not appear, however, that this need give rise to serious engineering difficulties, as the main sewer could be carried along the bed of the river beneath the culverts in question.

[The above "General Report," though completed by Mr. T. W. Thompson, had not been signed by him at the date of his death, 25th February 1896. His reports on each district, separately, which follow as Appendices I. to VI., were at that date likewise complete, with very few exceptions. These subsidiary reports are printed practically as he left them.—W. H. P.—April 1896.]

APPENDIX I.

RUMNEY RIVER AREA.

Districts West of River.				Districts East of River.			
			Page				Page
Gelligaer and Rhigos, Rural	-	-	16-17	Rhymney, Urban	-	-	18-19
Caerphilly, Urban	-	-	23-25	Bedwellty, Urban	-	-	19-21
Llandaff and Dinas Powis, Rural	-	-	25	St. Mellons, Rural	-	-	21-23
Cardiff, Urban	-	-	25				

GELLIGAER AND RHIGOS RURAL DISTRICT.

Date of formation, 1894.

Parish of Gelligaer only :—

Area, 16,772 acres.

Population, 1881—11,592 ; 1891—12,754.*

Inhabited houses, 1881—2,145 ; 1891-- 2,417.†

Assessable value (May 1895), 69,117*l*. Sanitary rate, 4*d*. in £.

Balance of outstanding loans under Sanitary Acts, nil.

Balance of outstanding loans under other Acts, 2,000*l*.

Registration district, Merthyr Tydfil.

Registration sub-district, Gelligaer.

Amount expended upon sewerage works during the past 10 years, 2,265*l*.

This rural district, which formerly constituted a part of the Merthyr Tydfil Rural District, comprises the parishes of Gelligaer and Rhigos. It is with the former alone that this report is concerned ; the parish of Rhigos is not within the drainage area of the River Rumney. The parish of Gelligaer, though largely rural in character, is nevertheless of considerable importance from the point of view of the present inquiry. It not only abuts upon the western bank of the River Rumney for a distance of some eleven miles, and upon both banks of its tributary the Bargoed-Rumney throughout its whole course, but also contains some considerable centres of population, and appears, moreover, to have an important future before it in regard to the coal-mining industry. The chief centres of population in that portion of the parish draining directly or indirectly into the River Rumney are as follows :—

In the Rumney Valley :—											Approximate Population.
Pontlottyn	-	-	-	-	-	-	-	-	-	-	3,040
Troedrhiwfruwch	-	-	-	-	-	-	-	-	-	-	530
Tyr Phil	-	-	-	-	-	-	-	-	-	-	1,180
Brithdir	-	-	-	-	-	-	-	-	-	-	860
Bargoed	-	-	-	-	-	-	-	-	-	-	1,005
Gilfach	-	-	-	-	-	-	-	-	-	-	320
Hengoed	-	-	-	-	-	-	-	-	-	-	125
Ystrad Mynach	-	-	-	-	-	-	-	-	-	-	220

In the Bargoed-Rumney Valley :—

Fochrhiw	-	-	-	-	-	-	-	-	-	-	805
Deri	-	-	-	-	-	-	-	-	-	-	850

The inhabitants of the part of the district draining to the Rumney are almost exclusively engaged at the important collieries at Pontlottyn, Gilfach, Fochrhiw, and Deri, and at collieries in the Bedwellty Urban District. There is still a large quantity of steam coal to be worked in the Gelligaer parish. At the time of my visit there was, in the south of the parish, one large taking still unlet, but negotiations were going on with a view to letting it, and the coal-mining industry is likely to undergo considerable development in this part of the district in the near future. There are no iron or tin-plate works in the Gelligaer portion of the Rumney Valley.

Sewerage and Drainage.—The chief centres of population have mostly been sewered in recent years by glazed socketed stoneware pipes with clay joints. The sewers are ventilated in most cases by a few upcast shafts ; but their ventilation, speaking generally, appears to be defective, especially, for instance, at Brithdir, an almost entirely new colliery village, where the only arrangement for ventilating the sewers consists of one 6-inch upcast shaft, and a few rain-water down spouts which are directly connected with the drains. Arrangements have in some cases been made for flushing the sewers, as, for instance, at Pontlottyn.

* Estimated to middle of 1894—14,382.
† Estimated to middle of 1894—2,736.

Certain of the smaller villages, however, such as Troedrhiwfuwch, Hengoed, and Ystrad Mynach, are not sewered, the houses being drained independently or in groups on to fields, or into watercourses communicating with the river. In the newer centres of population the house drains usually consist of stoneware pipes, and the yard sinks are trapped with stoneware gulleys. In the case of older property, however, as in parts of Pontlottyn, at Fochrhiw, Hengoed, and Ystrad Mynach, and elsewhere, the house drainage is often of a very defective character, consisting sometimes of open stone channels, in which sewage is apt to stagnate, or of box drains. In certain cases, owing to the absence of any house drainage, slops are thrown into the river or its tributaries, as at Ystrad Mynach, or on to the open ground in the neighbourhood of dwellings. Many yard sinks appear to be either untrapped or defectively trapped.

Sewage Disposal.—Definite attempt has been made by this local authority to minimise the pollution of the river by sewage. Thus, at Pontlottyn, Tyr Phil, Brithdir, Gilfach, and Deri, arrangements have been made for passing most of the sewage over plots of grassland before allowing it to find its way into the river; and in some of these cases, notably at Pontlottyn, there can be no doubt that the contamination of the river has been considerably limited thereby. These attempts of the Rural Council, though well meant, cannot be regarded as at all generally satisfactory. Thus, at the time of my visit, the sewage from Tyr Phil, instead of being distributed over the land, was being allowed to flow down a little ditch direct to the river. At Brithdir it was being discharged at one spot near the river, where it was causing an offensive local accumulation, and some of it was passing by a little channel direct to the river. Even at Pontlottyn, where it appeared to me that such of the sewage as was being conveyed to the land failed to reach the river until it had filtered through the soil, the sewage of some other parts of the town, including the excrement from the privies in King-street, is habitually conveyed direct to the river instead of being taken for irrigation through the fields. Moreover, the circumstances under which the District Council have obtained the use of the plots of land in question do not afford adequate security that the sewage will be properly dealt with in the present, as may be gathered from my experience with regard to the sewage fields at Tyr Phil and Brithdir, nor can they be regarded as ensuring the availability of the land for any long period in the future.

At Bargoed, a mining town of considerable size, no similar arrangements have been made for the treatment of sewage by irrigation, the sewage being conveyed by three separate outfalls into ditches leading to the river. At Fochrhiw the sewage is conveyed to a tank, the overflow of which was at the time of my visit conveying a quantity of offensive decomposing sewage to the Bargoed Rumney.

Excrement and Refuse Disposal.—Hand-flushed hopper pans, provided with traps, are in common use at Pontlottyn, Tyr Phil, Brithdir, Gilfach, Fochrhiw, and Deri. At Bargoed pail closets are almost exclusively used, and these have also been generally adopted at Ystrad Mynach. At some of these localities, however, a certain number of old privies still exist, as well as in some of the smaller villages, such as Troedrhiwfuwch, Hengoed, and Pentwyn. Some of the privies in the district are of a most objectionable character. Thus, the privies on the south side of King-street, Pontlottyn, are erected over an old culvert, into which they directly discharge; others were met with elsewhere in a very dilapidated condition. The pail closets are cleansed daily under contract with the District Council at Bargoed, and weekly at Ystrad Mynach; at the latter place, however, the cleansing of pail closets did not appear to me to be satisfactorily carried out. Cleansing of privies is not undertaken by the District Council. Ashes and house refuse are collected, either in open iron ash bins fixed in certain public situations by the District Council, or in pails or other receptacles. In the more important centres of population, such as Pontlottyn, Tyr Phil, Brithdir, Bargoed, ashes and house refuse are removed daily by the District Council's contractors. At Gilfach they are removed bi-weekly, and at other villages weekly.

Water Supplies.—Pontlottyn is supplied from the Rhymney Iron Company's Waterworks. Troedrhiwfuwch is not yet furnished with a public supply. Tyr Phil obtains water, but in insufficient quantity, from the New Tredegar Gas and Water Company. Brithdir, in so far as it is within the area of the same water company, is in like case. Bargoed, Gilfach, Hengoed, and Deri, are supplied by the Bargoed Gas and Water Company. Fochrhiw and Ystrad Mynach are supplied, in each instance, from local waterworks provided by the District Council.

River Pollution.—Although, as already said, attempts have been made by the District Council, and by no means altogether without success, to limit the pollution of the Rumney by sewage, a considerable quantity of "untreated" sewage, nevertheless, habitually finds its way into the river from Pontlottyn, Bargoed, Fochrhiw (through the Bargoed Rumney tributary), and some small quantity from such villages as Ystrad Mynach and Hengoed. Moreover, at the time of my visit a considerable quantity of sewage was finding its way into the river without any adequate treatment from the irrigation fields at Tyr Phil and Brithdir. Coal washing is carried on at Brithdir, at the washery of the Powell Dyffryn Steam Coal Company. The washery, however, is of a modern type, and the water employed in it is used again and again, being ultimately turned into a settling tank before being discharged into the river. The tank was empty at the time of my visit, and I am, therefore, unable to speak as to the character of the effluent.

RHYMNEY URBAN DISTRICT.

Date of formation, April 1874.

Area, 2,592 acres.

Population, 1881—8,663 ; 1891—7,733.*

Inhabited houses, 1881—1,578 ; 1891—1,568.

Annual assessable value, 16,712*l*. General district rate { Rhymney, 2*s*. } 1893-94.
 { Llangynidr, 1*s*. }

Balance of outstanding loans under Sanitary Acts } 2,028*l*. at Ladyday 1894.
 Balance of outstanding loans under other Acts }

Registration districts, Bedwellty, Crickhowell.

Registration sub-districts, Tredegar and Llangynidr.

Amount expended upon sewerage works during the past 10 years, 1885—1894, 512*l*. 9*s*. 8*d*.

This district, which lies at the head of the Rumney Valley, is mainly situate within the county of Monmouth, of which it occupies the extreme north-western portion. It, however, extends northwards for some distance up the slope of the Llangynidr mountain in Brecknockshire. On the north it is bounded by the Crickhowell Rural District, on the east by the Tredegar Urban District, on the south by the Bedwellty Urban District, and on the west by the Gelligaer and Rhigos Rural District (Glamorganshire), from which it is separated by the Rumney River, on the eastern bank of which it abuts for about five miles. The town of Rhymney constitutes the chief centre of population. The inhabitants are mostly engaged in coal mining; and although there are but two “working” pits within the district, the Rhymney and Maerdy pits, the Rhymney Iron Company, Limited, which owns them owns also three other working pits in the Gelligaer and Rhigos Rural District, on the opposite side of the river (where a fourth pit is about to be sunk), which give employment to many of the inhabitants of Rhymney. The above collieries are all working steam coal, at depths varying from 250 to 300 yards. The new pit will be sunk to a depth of 300 yards. This company’s extensive iron and steel works, which are situated at Rhymney, were all closed, and it is believed permanently, in 1891. In regard to the future prospects of this district, the representatives of the Urban District Council appeared hopeful, pointing out that, notwithstanding the closing of the extensive iron works, there had been no exceptional poverty in the district, and that many of the men who then left had since returned to find work in collieries. Moreover, they stated that, in consequence of the development of the coal trade, the rateable value of the district had already quite recovered the fall which followed upon the closing of the iron works. As to the future of the coal trade, the manager of the colliery expressed to me the view that the coal would be worked out in some 20 or 30 years; but the representatives of the District Council, who base their view upon the opinions of persons experienced in local mining operations, anticipate that it will not be exhausted for a considerably longer period.

Sewerage and Drainage.—No system of sewerage has yet been carried out in this district. Main sewers at present consist chiefly of old stone culverts, put down by the Iron Company many years ago for storm water purposes, while branch sewers consist largely of old box drains. Certain of the streets, however, have more recently been sewered with glazed stoneware socketed pipes, from 6 to 18 inches in diameter, laid in such a manner, it is said, as to fall in with some future sewerage scheme.

House drainage is also, speaking generally, of a very defective character, consisting sometimes of defective open channels having untrapped connexions with the sewers, and often of old box drains. Such box drains are sometimes trapped only with iron lip-traps, and in other cases are not trapped at all. Both the main stone culverts and the old box sewers and house drains pass in some instances under dwellings.

Sewage Disposal.—No arrangements have yet been made with regard to the purification of sewage. It is all turned in a crude state into the river by way of various sewers and old box drains.

Excrement and Refuse Disposal.—There are some few water-closets in the district, and also about 100 pail closets; but excrement disposal is mostly by means of cesspit privies, the brick cesspits of which appear in many cases to be built in cement, though not rendered

Some of the privies are, however, built over old and defective sewers, into which they discharge, and for which they furnish the chief means of ventilation. That such closets are in the highest degree objectionable it need hardly be said. The cleansing of privies is left to the owners and occupiers of property, and although many of the dwellings possess some little garden ground, this is by no means invariably the case. Where gardens exist, moreover, they are not always large enough to afford suitable means of disposing of the filth from the privies.

* The population is regarded by the Medical Officer of Health as being now considerably in excess of the enumerated population of 1891, owing to the return of a number of persons who left the districts upon the closing of the iron works, and who have now found employment in collieries in consequence of the development of coal mining in adjoining districts; practically, all houses are said now to be occupied.

Ashes and house refuse are removed from premises daily under contract with the District Council. Some few houses are provided with ash-bins; but most of the inhabitants collect their refuse in pails or boxes, which they put out each morning for the contractor.

Water Supply.—The district is supplied by the waterworks of the Rhymney Iron Company. The water is collected in a large reservoir, whence it is conveyed by an open conduit (liable to receive contaminating matters) to a smaller reservoir for delivery to Rhymney and Pontlottyn.

River Pollution.—The Rumney is very seriously polluted by sewage as it passes through this district; for notwithstanding that much of the excrement is kept out of the sewers by the prevailing use of the objectionable cess-pit privy, the sewage, owing to the decomposition which takes place in the defective sewers, is of a highly offensive and polluting character. As a consequence the river is said to be often in a highly offensive condition, especially during dry seasons, when it really contains little else than decomposing sewage. There is neither coal washing nor tin-plate working in this district; the trade pollution, which consists of the refuse from a brewery, slaughter-houses, and other domestic trades, is therefore of a less serious character than that met with in many of the other districts visited. At the time of my visit, however, ashes and refuse were seen to have been recently thrown in the river in the upper part of the district.

Points in regard to the Disposal of Sewage.—There are a number of fields, having an aggregate area of some 100 acres, abutting on the river in the southern portion of the district. These would probably be suitable for the disposal of sewage.

There does not appear to have been any subsidence of the ground in the neighbourhood of the river, and the Surveyor does not anticipate that the construction of a main trunk sewer along the line of the river would be attended by any serious engineering difficulties. The river, however, is culverted over for some 300 yards in the neighbourhood of the iron works, and for a shorter distance near the company's offices.

BEDWELLY URBAN DISTRICT.

Date of formation, May 1891.

Area, 7,672 acres.

Population, 1881—3,622; 1891—6,773.

Inhabited houses, 1881—737; 1891—1,272.

Annual assessable value, 25,733*l.* General district rate, 3*s.* in the £., 1893–94.

Balance of outstanding loans under Sanitary Acts } 11,025*l.* at Ladyday 1894.
Balance of outstanding loans under other Acts }

Registration district, Bedwellty.

Registration sub-districts, Tredegar and Rock Bedwellty.

Amount stated to have been expended upon sanitary works during the last four years :

	£.	s.	d.
1892	-	-	46 6 9
1893	-	-	186 19 9
1894	-	-	261 18 11
1895	-	-	261 2 8
	£. 756	8	1

Lying on the extreme west of the county of Monmouth, this large urban district extends into the valleys of both the Sirhowy and Rumney rivers. For some three miles it occupies both banks of the Sirhowy river, and lower down it occupies the western bank of that river for about another three miles; while for a distance of between six and seven miles it also abuts on the eastern side of the Rumney river. The valleys which are cut through the Pennant Grit by these rivers are for the most part steep and narrow. On the north the district is bounded by the Rhymney and Tredegar urban districts, on the south by the St. Mellons rural district, on the east by the Ebbw Vale and Abercarn urban districts and the St. Mellons rural district, and on the west by the Gelligaer rural district (Glamorganshire), from which it is separated by the River Rumney.

The chief centres of population are New Tredegar and Elliott Town, Cwmsiflog, Aber-Bargoed, Pengam, and Fleur-de-Lis (part of), which are situate in the Valley of the Rumney; and Hollybush, Argoed, and Blackwood, situate in the Sirhowy Valley. The inhabitants of the district are mostly engaged in coal mining and in agriculture. In addition to a number of levels working the Mynyddislwyn superficial vein of house coal, there are in the district four deep pits working steam coal, known as the Powell Dyffryn Pits, all of which are situate in the Rumney Valley, two above and two below New Tredegar. The Mynyddislwyn house coal is stated to be already almost worked out, but the district is rich in steam coal, which is still untouched over extensive areas in both the Rumney and Sirhowy Valleys. Throughout the whole of that part of the district which lies in the Sirhowy Valley the steam coal is, in fact, still intact, and this valley is regarded as one of the richest of the South Wales coal-field. Indeed, although the seams of steam coal are

very deep (some 800 yards), and considerable difficulty is met with owing to the quantity of water in the Pennant Rock, circumstances which are considered likely to retard the development of this coal region, the future prospects of the coal industry in this district would appear to be very good. The effect of the extension of that industry is already seen in the considerable increase in population between the years 1881 and 1891, an increase most conspicuous in the mining villages of New Tredegar, Elliot Town, and Cwmeffog, the former of which is now a town of some 4,000 inhabitants, and building is still going on there. A number of houses have, however, also been erected during recent years at Blackwood and Hollybush in the Sirhowy Valley.

Sewerage and Sewage Disposal.—Such sewerage as is provided in this district is for the most part of a piecemeal and unsatisfactory character, and nowhere has any provision been made for the ventilation or flushing of sewers. As regards sewage disposal, practically the whole of the liquid sewage of the district finds its way, “untreated,” either directly or indirectly into the Rumney and Sirhowy rivers. The most important centre of population, New Tredegar, has been drained during the last 10 or 12 years by glazed socketed pipe sewers, which convey most of the crude sewage of the town to the River Rumney by two outfalls, though some of the sewage finds its way to that river indirectly by means of ditches. Elliott Town, which is practically continuous with New Tredegar and comprises some 120 houses, all erected during the last 10 years, has been sewered by glazed socketed pipe sewers to one outfall in an old culvert leading to the River Rumney. In the case of other villages in the district no attempt at systematic sewerage appears to have been made, different groups of houses being either drained by varying lengths of glazed pipe sewers, or, as in the case of parts of Blackwood, by old box drains of uncertain course, age, and character.

House Drainage.—In not a few cases, house drainage is either of a defective character, or is altogether absent. In the latter case slops are thrown on the gardens or into roadside channels, where they tend to accumulate and give rise to nuisance. In the case of newer dwellings, yard sinks are provided, furnished with stoneware gulleys; but the very unsatisfactory trap known as the “iron lip-trap” is commonly to be met with in older property. In some cases yard sinks were found untrapped.

Disposal of Excrement and Refuse.—At New Tredegar and Elliott Town, excrement disposal is mainly accomplished by hand flushed pan and siphon closets; but some cess-pit privies still exist. As regards the remaining villages, excrement is mostly disposed of by cess-pit privies, though pails have in some cases, notably at Hollybush, been provided. In certain instances cess-pit privies have, for special reasons, been converted into pan and siphon closets at the instance of the District Council. As an example of this may be mentioned some houses on the east side of Higher Blackwood, where, owing to the smallness of the gardens, and proximity of the privies to the dwellings, considerable improvement has recently been effected by the conversion of the privies into pan and siphon closets. To facilitate the disposal of ashes and house refuse, open iron ash-bins have been provided by the Council at certain points in several of the villages. In regard to the ultimate disposal of excrement and refuse, the cleansing of all privies and pail closets in the district is left to the owners or occupiers, except at Hollybush, where the pail closets are scavenged by the District Council’s contractor. Ashes and house refuse are removed, under contract with the District Council, daily at New Tredegar and Elliott Town, while in the other villages the public iron ash-bins are emptied under contract once in each week.

From what has been said it will appear that there is considerable room for improvement in the matter of excrement and refuse disposal in this district. The privies are in many cases of most objectionable type, and are only emptied at long intervals. Thus the houses in two new streets at Blackwood (Stanley Terrace and Lewis-street), which have but small gardens, are provided with privies discharging into huge receptacles, which extend under the floors of the privies, and can only be emptied by removal of the flags constituting the floors. At the time of my visit I was informed that some of these cess-pits had just been emptied for the first time since their construction some three years ago. In other cases privies and pail closets were found to be over full. In the rural villages, such as Fleur-de-Lis, most of the houses have ample garden ground for the disposal of excrement and refuse; but even there some of the privies and pails were found to be quite full owing to the negligence of the occupiers. Considerable improvement has, however, been effected in certain quarters by the conversion of privies into pan and siphon closets; and the adoption of pail closets, scavenged by contract, at the new houses at Hollybush, is a great advance on the old system of cess-pit privies.

Water Supply.—The villages in that portion of this district which is situate in the Sirhowy Valley, and which lie within the area over which the Western Valleys (Monmouthshire) Water and Gas Company possess statutory powers, are very defectively supplied with water owing to the failure of that Company to provide them with any supply. As a consequence, they at present depend upon such makeshift arrangements as the District Council have been able to secure. Thus Hollybush is supplied from a mountain spring, the property of a private owner, which is collected in a pond, whence it is conveyed to a tank from which it is supplied by gravitation to two standpipes in the village. At the time of my visit to the pond in question, cow dung was conspicuous on

its banks, and additional evidence of the fact of its being resorted to for drinking purposes by animals was afforded by the prints of horses' hoofs about the water's edge. Argoed is supplied mainly from the engine tank at the railway station, partly from local springs. The former water is obtained from the hillside springs, and is laid on from the engine tank to several standpipes in the village. Of the springs in the lower part of the village, where cases of enteric fever recently occurred, one appeared to me as being in all probability liable to pollution. Blackwood is supplied by a spring which is led to a tank, from whence it is laid on to standpipes in different parts of the village. This supply is described in recent Annual Reports of the Medical Officer of Health as very insufficient. As regards the Rumney Valley, New Tredegar, Elliott Town, and Cwmeinfog are supplied by the New Tredegar Gas and Water Company, which also supplies Tyr Phil and Brithdir on the Glamorganshire side of the river (Gelligaer Rural District). The water is obtained from springs and also from an old coal level on the Glamorganshire side of the river. It is collected into two storage reservoirs having a collective capacity of some 24,000 gallons, and is thence laid on in iron pipes to the houses at New Tredegar and Elliott Town, though few of the inhabitants at present use the water at Cwmeinfog. This water is regarded as free from likelihood of organic contamination, though it is of a chalybeate character. Great difficulty has, however, been met with by this Water Company in the past owing to the disturbances of the strata, consequent upon mining excavations, as a result of which their springs have upon two occasions suddenly failed and fresh tunnelling has become necessary.

Aber Bargoed, Pengam, and Fleur de Lis are now supplied by the Rumney Valley Gas and Water Company from water obtained by springs at Deri on the Glamorganshire side of the river. The water is conveyed to a reservoir at Bargoed in the Gelligaer Rural District, whence it is conveyed across the valley in iron pipes to the villages in question.

Pollution of Rivers.—From what has been said it will have appeared that there is considerable pollution of the rivers in this district by sewage, especially of the river Rumney at New Tredegar where the population is considerable. In this locality also I found abundant evidence of the tipping of ashes and of house and stable refuse over the steep bank of the river just above the bridge. There is no coalwashing actually in the district, the coal from the Powell Dyffryn Collieries being washed at Brithdir on the Glamorganshire side of the river [*see* Gelligaer Rural District, page 17]. Neither is there any pollution of the rivers by tin-plate works.

Facilities for the treatment of Sewage.—As regards the Rumney Valley there are certain small areas of meadow land near the river at Tredegar and Cwmsifog, but their suitability for sewage treatment is very doubtful, and it is considered by the Surveyor that in order to find sufficient land for the treatment at one outfall of the sewage from New Tredegar, Elliott Town, and Cwmsifog it would be necessary to go below Pengam, a distance from New Tredegar of seven miles as the crow flies. In such case the question arises as to whether the more satisfactory method would not be a joint scheme with the Gelligaer Rural and Caerphilly Urban Districts, a scheme which might also include the Rhymney Urban District and the villages abutting on the river in the St. Mellons Rural District, and thus solve the problem of sewage disposal for the whole valley. In the Sirhowy Valley there appears to be land which might serve for the treatment of the sewage of Hollybush and Blackwood, but here also a joint scheme for the river would probably afford more satisfactory results. In regard to neither of the valleys in this district did I learn of any special engineering difficulties with respect to the construction of main trunk sewers along the course of the river.

ST. MELLONS RURAL DISTRICT.

Date of formation, 7th March 1895.

Area, 48,421 acres.

Population, in 1881, 12,000 (estimated); census 1891, 14,389.

Inhabited houses, census 1881, 2,283; census 1891, 2,641.

Assessable value, 91,452*l.*; sanitary rate, 1*d.* in the *£*.

Balance of outstanding loans under the Public Health Acts, Nil.

Balance of outstanding loans under other Acts, Nil.

Registration districts, Newport and Cardiff.

Registration sub-districts, Saint Woollos, Newport; Mynyddislwyn, Cardiff.

Amount expended on sewerage work during the last ten years, 140*l.*

The St. Mellons Rural District was formed in March 1895 by the division, under the provisions of the Local Government Act, 1888, of the Newport Rural Sanitary District into two separate districts, viz.: the St. Mellons and the Magor Rural Districts.

The St. Mellons District occupies a considerable area comprising the whole or portions of the parishes of Bedwas, Bettws, Coedkernew, Dyffryn, Graig, Henllys, Machen upper, Machen lower, Malpas, Marshfield, Michaelstone-y-Vedw, Mynyddislwyn,

Peterstone, Rogerstone, Rumney, St. Brides (Wentloog), St. Mellons, and St. Woollos. It is very irregular in shape and extends into the three valleys of the Rumney, Sirhowy, and Ebbw rivers (and slightly into the valley of the Usk at the north of Newport Borough). On the north it abuts upon the Bedwellty Urban District, and on the south upon the Severn estuary. On the east it is bounded by the Llantarnam Urban District, and by Newport Borough, and on the west by the Rumney river, which separates it from Glamorganshire; while it is almost completely bisected by the Abercarn and Risca Urban Districts. The district which towards the north, where it extends up the river valleys, is hilly, becomes less undulating towards the south where the valleys open out, and is comparatively flat towards its southern border.

A considerable portion of its area which lies north and west of the Risca Urban District, is situate upon the Coal Measures, the remainder of the district being upon the Millstone Grit, Carboniferous Limestone, Old Red Sandstone, and alluvium, in that order from north-west to south; the Old Red Sandstone constituting the chief formation in this area.

The most important centres of population which lie in the drainage area of one or other of the rivers with which this report is concerned, are—

In the Rumney Valley :

	Estimated Population.
Fleur-de-Lis (part) - - - - -	450
Maesycwmmer - - - - -	800
Bedwas - - - - -	800
Machen - - - - -	1,000
St. Mellons - - - - -	650
Rumney - - - - -	540

In the Sirhowy Valley :

Cwmcorrwg - - - - -	80
Gwrhay - - - - -	80
Rhiw - - - - -	130
Woodfield - - - - -	130
Tredegar Junction and Pont Llanfraith - - - - -	300
Gelligroes - - - - -	80
Ynysddu - - - - -	10

In the Ebbw River :

Risca Road - - - - -	100
Tydu - - - - -	200
Rhiw-deryn - - - - -	300
Rogerstone - - - - -	1,300
Bassaleg and Pentrepoeth - - - - -	280

The principal occupations of the people are coal mining, steel working, tin-plate working, and agriculture. The coal miners are employed in working the Mynyddislwyn vein of house coal at several localities in the district, or at deep pits working steam coal in neighbouring districts, such as the new Llanbradach pit in the Caerphilly Urban District, which gives employment to a number of the people at Maesycwmmer and Bedwas. There are no deep pits within the district itself. The extensive steel works of Messrs. Nettlefold & Co., which some nine years ago were transferred from the Midlands to Rogerstone, in the Ebbw Valley, find employment for most of the inhabitants of that village, which has almost entirely sprung up since the introduction of these works. There are no tin-plate works in the district, the works at Machen having been permanently closed some years ago. Some of the inhabitants of Machen, however, now find employment at the Waterloo Tin-Plate Works in the Llandaff, and Dinas Powis Rural District, on the other side of the river Rumney. At Maesycwmmer there are Pyroligneous Acid Works.

Sewerage and House Drainage.—Certain of the villages possess sewers of one or another sort, but others are at present practically unsewered. Rogerstone was sewered by the property owners (Messrs. Nettlefold & Co.), when the village came into existence, with glazed stoneware pipes, the sewers being ventilated by the surface water gratings which are left untrapped for this purpose. The Risca Road group of houses was sewered by the property owners some five years ago with glazed socketed pipes having clay joints. Bassaleg and Pentrepoeth were sewered about two years ago by the Rural District Council with glazed socketed stoneware pipes; this sewer, which is about three-quarters of a mile in length, being ventilated by three ventilators fixed just above the street level against garden walls. Maesycwmmer has two principal sewers; one a glazed socketed stoneware pipe sewer with cemented joints put down years ago, and the other an old box sewer which has in different places been replaced by pipe sewer. The remaining villages are practically unsewered. The larger of them, especially Bedwas, where serious nuisances abound, are much in need of proper sewerage. House drainage is very commonly defective or absent. In some cases yard sinks are properly trapped with stoneware gulleys, but iron lip-traps are very frequently met with, and many slop drains are altogether untrapped.

Sewage Disposal.—The sewage of Rogerstone, Bassaleg, and Pentrepoeth, and Risca Road, is discharged “untreated,” directly or indirectly, into the river Ebbw. Of the two main outfalls at Maesycwmmmer, the sewage from one is to some extent passed over land before reaching the river Rumney; that from the other, comprising most of the sewage from the village, finds its way down a watercourse through a plantation to the river.

From most of the other villages more or less slop sewage finds its way into one or other of the rivers, many houses being separately drained directly to the rivers. In a number of instances, however, cesspools have been resorted to with a view to avoiding pollution of the river by slop sewage, and in many other cases, where no house drainage exists, slops are disposed of upon the gardens; the latter method, however, frequently leads to the accumulation of decomposing sewage in the neighbourhood of dwellings, with resulting nuisance. In some cases slops are thrown into the rivers or streams.

Excrement and Refuse Disposal.—Excrement disposal is by pail closets or by privies. Pail closets, some of which are to be found in most villages, are, at Tydu and Rogerstone, where they constitute the chief mode of excrement disposal, scavenged under contract with the Rural District Council; elsewhere this cleansing is left to owners or occupiers. The privies are in many cases of a very defective character, and must inevitably give rise to nuisance. The removal of ashes and house refuse is carried out by the Rural District Council under contract at Tydu, Rogerstone, Bassaleg, Pentrepoeth, Machen, and Bedwas. In the smaller villages or hamlets its disposal is left to occupiers, who mostly have fair-sized gardens; in some cases, however, ashes are thrown into the rivers.

Water Supply.—Rogerstone and Tydu are supplied from the mains of the Newport Corporation. This water is stated to be laid on to almost all the dwellings in those villages. Bassaleg and Pentrepoeth are supplied by a spring which is piped from an adjacent hill to iron tanks in the villages; this supply is locally believed to be ample. Maesycwmmmer obtains water from the Rumney Valley Water Company, and the supply is said to be plentiful and good. This Company’s mains have also been recently laid on to Fleur-de-lis.

The remaining villages and hamlets are dependent upon local springs, the water from which is in some cases of doubtful purity as well as insufficient. The supplies of Bedwas, Machen, and Tredegar Junction (including Pont Llanfraith) appear to be particularly unsatisfactory.

River Pollution.—There can be no doubt that by adhering to dry methods of excrement disposal, which cannot be said to be inapplicable to rural villages, and by encouraging the construction of cesspools for the disposal of slop sewage, the Rural District Council have endeavoured to limit the pollution of the rivers in their district. Their success in this respect has, however, been of a very partial character, and, as has been noted, a considerable quantity of slop sewage, not only from the larger villages, which are provided with sewers, but also from numerous scattered groups of dwellings, finds its way, without any attempt at purification, into the several rivers. Land might possibly be obtained for the treatment of sewage in regard of the principal villages, such as Tydu, Rogerstone, Machen, Bedwas, and Maesycwmmmer, at the latter of which places some Pyroligneous Acid Works drain to a tributary of the Rumney; and in this way, along with the rigid insistence upon the adoption either of cesspools or of some method of purifying the slop sewage of all scattered houses and hamlets, the pollution of the rivers might, no doubt, be largely reduced. But a plurality of separate arrangements for sewage purification would not tend to general efficiency, and a system of cesspools would be attended by grave evils, unless the cesspools were properly constructed and were frequently cleansed by the District Council.

CAERPHILLY URBAN DISTRICT.

Date of formation of district, April 1893.

Area, 17,000 acres.

Population, 1881, 8,500; 1891, 10,000.

Inhabited houses, 1881, 1,500; 1891, 1,700.

Annual assessable value, 28,050*l*.

General district rate, 2*s*. 8*d*. in the *£*. for the year 1893–94.

Balance of outstanding loans under the Public Health Acts, 5,234*l*. (January 1896).

Balance of outstanding loans under other Acts, nil.

Registration district, Pontypridd.

Registration sub-district, Eglwysilan.

This extensive urban district, which comprises parts of the parishes of Llanfabon and Eglwysilan and is thus wholly situate in the county of Glamorgan, until recently

constituted a part of the Pontypridd Rural Sanitary District. On the north it is bounded by the Gelligaer and Rhigos Rural, and the Merthyr Tydfil and Mountain Ash Urban Districts; on the south and east by Llandaff and Dinas Powis Rural District; elsewhere, on the east, by the Rumney river, which separates it from the St. Mellons Rural District; and on the west, by the Pontypridd Urban and the Llantrisant and Llantwit Fardre Rural Districts. The southern portion is situate upon the Millstone Grit, and Carboniferous Limestone, which crop out from beneath the South Wales Coal Measures at the southern anti-clinal ridge; but the more northerly, and by far the larger, portion of the district is situate upon the coalfield. Coal-mining constitutes the chief industry of the people, and the valuable seams of steam coal in this locality being practically intact, the district would appear to have an important industrial future before it, and a large increase in its population may consequently be anticipated. Until recently coal-mining operations in this locality have been limited to working the superficial Mynyddislwyn vein of house coal, mainly from "levels"; but of late years a deep pit to the steam coal has been opened at Llanbradach in the Rumney Valley, and, as a consequence, an extensive mining village has already sprung up there. At the present time another deep pit is in process of sinking at Senghenydd in the Aber Valley, where a number of houses, and four hotels, have already been erected, and building is going on rapidly. It is estimated that a few years hence Llanbradach and Senghenydd will each have a population of some 5,000 persons. Moreover, the early sinking of other deep pits in the district is in contemplation.

Occupying parts of three valleys (the valleys of the Taff, the Rumney, and the Aber (a tributary of the Rumney), and the intervening Pennant ridges, the district is, of course, hilly.

The chief centres of population of the district, within the watershed of the Rumney river, are:—

	Estimated.
Caerphilly, present population - - - - -	3,000
Llanbradach, present population - - - - -	1,500
Senghenydd, present population - - - - -	1,200
Aber, present population - - - - -	200

Sewerage and Sewage Disposal.—The old town, Caerphilly, has been partly sewered by the Pontypridd Rural Sanitary Authority at different times during the last 15 years, and certain newer streets have been more recently sewered by the Urban District Council. The sewers, which also carry storm water from the road gulleys, mostly consist of glazed stoneware socketed pipes, though a few old box drains are said to still remain. The sewers are ventilated by a few street-level gratings and some eight or nine ventilating shafts carried up the walls of houses. Speaking generally, however, the ventilation of the sewers, except those more recently laid, appears to be defective. The arrangements for flushing the sewers, which apparently consist of 3-inch pipes, taken direct from the water mains to the sewers, and fitted with stop-cocks, would seem to be both improper and insufficient. Most of the Caerphilly sewers converge to a main 16-inch pipe outfall sewer, which discharges the sewage, "untreated," into the Cledr brook, a tributary of the Rumney river. The recently laid sewer in St. Martin's-road, however, forms an exception, in that it discharges its sewage on to some rough grass land, the effluent ultimately finding its way to the Cledr brook.

At Llanbradach (including Pwllypant) no complete sewerage system has been provided, the several terraces of houses being drained by pipe sewers (put down by the property owners), which in most cases deliver to cesspools. Abercarn-street, however, is drained to a brook which is tributary to the Rumney river. The cesspools in question are regarded as a temporary expedient for avoiding pollution of the river, pending the carrying out of a proper system of sewerage. Some of them, which consist of mere holes dug in the gravel, are situate at a considerable distance from dwellings; but the cesspool which receives the sewage from a number of houses at Pwllypant overflows on to a field where, at the time of my visit, there was an enormous accumulation of most offensive decomposing sewage, only some 20 yards from the backs of some of the houses. Complaints as to the nuisance arising therefrom, and as to sore throats and other forms of ailment believed to be due thereto, were made to me by inhabitants. A new 9-inch pipe sewer had, however, just been put down, at the time of my visit, by the owner of the property concerned, with a view to carrying the sewage to a more distant cesspool in another direction, but the house drains had not, so far, been connected with it.

For the drainage of Senghenydd a 12-inch socketed pipe sewer with cement joints, some 500 yards in length, has recently been put down by the Urban District Council, and discharges direct into the Aber brook. It is ventilated by seven manholes, fitted with open gratings. As regards the provision of means of flushing for this sewer, it is proposed to divert the water from a small brook to the topmost manhole, but this has not yet been carried out. The sewerage of the different terraces and groups of houses herabouts is at present being left to the owners of property, and, at the time of my visit,

some of the sewers thus independently laid had not been extended to the main outfall sewer, and were discharging on to the open ground, thus giving rise to considerable nuisance.

Ystrad Mynach and Aber are not sewered, and some of the slop sewage at each of these places appears to get into the brooks, and so into the river.

The house drainage varies considerably in character. In some of the newer houses the house drains are disconnected from the sewer and ventilated. In certain instances, however, as at Llanbradach, even recently constructed house-drains seem to have been badly laid, and are said to be often choked. As regards newer property generally, yard-sinks are provided with stoneware gulleys, though many iron lip-traps are still to be found in the district. At Ystrad Mynach the house drainage is very defective.

Excrement and Refuse Disposal.—A considerable number of dwellings are now provided with pan and trap closets, rather more than half of which, it would appear, are fitted with flushing cisterns, the remainder being dependent upon hand flushing. There are, however, still a large number of privies in the district, and in some instances these have been provided for recently built houses. There are also a few pail or “box” closets. The pans to the water-closets are sometimes of the “long” and sometimes the “short” hopper pattern. Some of the former, not supplied with water, were found in a filthy condition. The boxes of the “box” closets at Llanbradach are of excessive size, and placed so far below the seat as to lead to splashing of filth on to the floor of the closet. Some of the old privies are of very objectionable sort.

Pail-closets, ashes, and house refuse, are scavenged by the Urban District Council's contractors. In parts of the district, as at Llanbradach, the scavenging is not satisfactorily done, and ashes were found strewn about in the back streets.

Water Supply.—Within the area of this district draining to the Rumney there are several separate water supplies. Caerphilly is supplied from works provided by, and under the control of, the District Council. The water is from springs, which run short in dry seasons. Llanbradach, which is supplied by the Rumney Valley Water Company, is well off for water; but in an outlying part of it (Pwllypant, comprising some 80 dwellings) water is often very scarce, the place being beyond the limits within which the Company is empowered to deliver water. Senghenydd, too, is in part only supplied with water by the Universal Coal Company.

River Pollution.—As has been said, the Rumney in this district receives directly or indirectly the sewage of several populous places. In addition, it is polluted by coal-washing as carried on at Llanbradach.

LLANDAFF AND DINAS POWIS RURAL DISTRICT (PART OF).

Five parishes within this district, viz.: the parishes of Van, Rudry, Rhydgwern, Llanvedw, and Llanedarn, abut upon the Glamorganshire side of the Rumney River. Collectively, these parishes comprise an area of 9,459 acres, upon which in 1891 there were 296 inhabited houses, occupied by an enumerated population of 1,496 persons. The population, which would not appear to have undergone any important increase since that date, is much scattered. The chief villages in the vicinity of the river are Rudry, Rhydgwern, and Draethan. At Rudry there are some tin-plate works, known as the Waterloo Tin-Plate Works; a terrace (Waterloc-terrace) of 18 houses, and a few other cottages. The tin-plate works were closed at the time of my visit, but I found that copperas tanks had been provided, and I was assured that none of the waste acid from the pickle tubs was allowed to get into the river. At Waterloo-terrace, pan-closets, with siphons draining to ventilated cesspools, are provided for excrement disposal, while the slop sewage is drained to an old level, and thence finds its way to the river, apparently undergoing some purification in its course. A few cottages, known as Green Meadow cottages, are drained into a small watercourse which goes to the river, and the privy of one of these cottages also discharges into this brook. At Rhydgwern the slop sewage of Green-row (4 houses) is piped to the river. New-terrace (20 houses), which is the chief group of dwellings in this locality, is drained to some fields, and I did not discover that any of the sewage obtained access to the river. Excrement is disposed of at Rhydgwern by pail-closets and privies, the former, which are being substituted for the latter, being a great improvement. Some of the dwellings are unprovided with a proper water supply. At Draethan, which is a small village consisting of a few scattered cottages and a public-house, some slop sewage and drainage from a pigsty find their way into a brook going to the river. Some of the houses have no drains, and slops are disposed of upon gardens. Excrement is disposed of by privies of objectionable character.

[CARDIFF URBAN DISTRICT. —This district abuts upon the western side of the river Rumney for a distance of about three-and-a-half miles. This portion of Cardiff, much of which consists of alluvial flats of marshy character, is practically destitute of population. There does not appear to be any pollution of the river except possibly by a little clay from the Heath Brickworks, and by the Roath Brook, which enters the river just below the Great Western Railway. This brook is stated to receive the drainage from the Cardiff Cemetery and the overflow from a cesspool at Roath Mill, but to be otherwise free from pollution.]

APPENDIX II.

SIRHOWY RIVER AREA.

<i>Districts West of River.</i>						<i>Districts East of River.</i>					
					Page.						Page.
Tredegar, Urban	-	-	-	-	26-27	Tredegar, Urban	-	-	-	-	26-27
Bedwellty, Urban	-	-	-	-	19-21	Bedwellty, Urban	-	-	-	-	19-21
St. Mellons, Rural	-	-	-	-	21-23	St. Mellons, Rural	-	-	-	-	21-23
Risca, Urban	-	-	-	-	28-29	Risca, Urban	-	-	-	-	28-29

TREDEGAR URBAN DISTRICT.

Date of formation, April 1874.

Area, 7,479 acres.

Population, 1881 census, 18,771; 1891 census, 17,341.

Inhabited houses, 1881 census, 3,359 ; 1891 census, 3,138.

Annual assessable value, 37,133*l*. General district rate, $\left. \begin{array}{l} 2s. 6d. \text{ Tredegar,} \\ 1s. 9d. \text{ Llangynidr,} \end{array} \right\} 1893-94.$

Balance of outstanding loans under the Public Health Acts,	{	Total debt at Lady-day, 1894, 72,454 <i>l</i> .
Balance of outstanding loans under other Acts,		

Registration districts, Bedwellty and Crickhowell.

Registration sub-districts, Tredegar and Llangynidr.

Amount expended upon sanitary works during the last six years :—

										£.	s.	d.
1890 -	-	-	-	-	-	-	-	-	-	854	6	1
1891 -	-	-	-	-	-	-	-	-	-	811	4	3
1892 -	-	-	-	-	-	-	-	-	-	1,022	2	9
1893 -	-	-	-	-	-	-	-	-	-	1,324	10	7
1894 -	-	-	-	-	-	-	-	-	-	1,174	19	3
1895 -	-	-	-	-	-	-	-	-	-	1,326	11	8

This urban district lies at the head of the Sirhowy Valley, occupying both banks of the river of that name. Its northern part is on the extensive slope of Millstone Grit and Carboniferous Limestone known as Llangynidr Mountain; while to the south it extends into the comparatively narrow valley which has been cut in the Pennant Grit of the Coal Measures by the Sirhowy River. The chief centres of population in the district are in their order from north to south:—

Tefarnabach, population at special census in 1892	-	-	274
Trevil	-	-	-
Nantybwlch	-	-	-
Dukes Town	-	-	-
Sirhowy and Four Rows	-	-	-
Tredegar Town	-	-	-
George Town	-	-	-
Whitworth Terrace, Glyn Terrace, Vale Terrace, and Pochin Crescent	-	-	-
Troedywgwair	-	-	-
Bedwellty Pits	-	-	-
Pochin Pit	-	-	-

Coal mining constitutes the chief industry of the inhabitants, there being at the time of my visit eight collieries in work within the district. Of these seven belong to the Tredegar Iron and Coal Company, Limited, and one (at Sirhowy) to the Ebbw Vale Steel, Iron, and Coal Company. The former are all working the deep seams of steam coal; the latter is working a little in the upper seams. The extensive iron works of the Tredegar Company were closed about three years ago, and most of the hands, after having been for some time employed by the Guardians in relief works, left the district. One small mill employing some 40 hands has, however, been recently re-opened at these works. There are no tin-plate works in the district.

Sewerage and House Drainage.—The sewerage and the house drainage in this district are both of a very unsatisfactory character. Certain streets have, it is true, been sewered by the Urban Authority at different times during recent years with glazed socketed pipes having cemented joints, which have been paid for out of current rates ; but the chief part of the town of Tredegar and other centres of population such as Sirhowy and Dukes Town are still dependent for sewage purposes upon old box drains or on circular brick culverts

put down many years ago by the Tredegar Iron and Coal Company, before the formation of the Local Board. In some cases these defective sewers pass under houses. Thus, in Queen-street, an old three-feet brick barrel sewer passes under 14 successive houses. As regards flushing, the High-street and Picton-street sewers are said to be flushed from the hydrants every fortnight or so; the Vale Terrace sewer is sometimes flushed after storms by a stream; other sewers depend on storm water for flushing.

Even the new sewers are unprovided with any special arrangements for ventilation, though, it is stated, they are about to be provided with open gratings at the street level. The general character of the house drainage corresponds with that of the sewerage. In the case of newer houses, glazed pipes have been provided, but many of the older dwellings are furnished with box drains, for the most part either untrapped or defectively trapped. Certain groups of houses have no drains at all, their slop sewage being simply thrown into roadside gutters or allowed to find channels for itself in the road surface, as in Union-street.

Sewage Disposal.—Except in the case of certain outlying groups of dwellings, such as Troedywgwair, where the sewage is discharged on to meadow land (which in the particular instance is but a short distance from the houses), practically all the sewage of the district passes without any attempt at purification into the Sirhowy River.

Excrement and Refuse Disposal.—About one-third of the dwellings are served by water-closets, which are for the most part hand-flushed only. At Sirhowy and at Dukes Town there are some pail closets, but many houses at the former place are furnished with privies built over culverts or over box drains. Ash bins are not numerous, house refuse being commonly stored in pails; these are scavenged under contract in Tredegar and George Town daily, at Dukes Town and Tefarnabach weekly. The contractor also scavenges pail closets throughout the district twice weekly, but cleansing of privies is left to the occupiers of dwellings.

Water Supply.—This district, until recently depending upon a water supply which, although believed to be of good quality, was altogether inadequate as regards quantity, is now provided with an entirely new supply under the Tredegar Water Works Act of 1892. The former supply was obtained from the Tor-y-fedw spring, on the east side of the valley, below Tredegar, and was filtered through sand and gravel before delivery. The dry weather flow of that spring, however, fell in 1887 to only 10,000 gallons per day. The new supply is obtained from a spring on the Llangynidr Mountain south of Trevil, known as Shon Sheffrey's Well, the lowest probable dry weather flow of which is estimated at 800,000 gallons a day. At present the water is being delivered in iron pipes direct from the spring, no arrangements having yet been made for filtering it.

The supply is constant. It is laid on to practically all the houses in the district, except Trevil, Tefarnabach, and Troedywgwair, which are supplied by local springs, and that part of the district supplied by Ebbw Vale Water Works (Dukes Town and Sirhowy). In the Tredegar district the water is separately laid on to each house, except in a few cases where one standpipe is provided for two or three dwellings.

River Pollution.—Very serious pollution of the Sirhowy is caused by the sewage discharged into it; a condition of affairs the more serious owing to the shallowness of the river, which indeed in dry seasons consists, as I am informed, of practically nothing but crude and of necessity decomposing sewage.

Coal washing is carried on at the Tytrist Colliery of the Tredegar Iron and Coal Company, and at the Sirhowy colliery of the Ebbw Vale Company. In each instance good sized settling tanks have been provided through which the waste water is passed before being discharged into the river. The washing at the Tytrist Colliery is of the modern Belgian kind, known as the "Coppu" washery, while at Sirhowy the washing is of the simpler kind, formerly more in use than at present, consisting of long wooden troughs. At this washery the water is not usually pumped back and repeatedly passed through the troughs, and it consequently, as a rule, passes in a continuous stream through the settling tanks on its way to the river, a method of procedure, which *qua* river pollution, would appear to be capable of amendment.

BEDWELLY URBAN DISTRICT.

(See Appendix I., pages 19–21.)

ST. MELLONS RURAL DISTRICT.

(See Appendix I., pages 21–23.)

RISCA URRAN DISTRICT.

Date of formation, May 1878.

Area, 4,178 acres.

Population, 1881—5,556 ; 1891—7,783.

Inhabited houses, 1881—1,104 ; 1891—1,393.

Annual assessable value, 21,555*l.* General district rate, 1*s.* 6*d.* in the *£*.

Balance of outstanding loans under Sanitary Acts 1,126*l.* 8*s.* 3*d.* for bridge ; 2,860*l.*

Balance of outstanding loans under other Acts - 8*s.* 1*d.* for cemetery.

Registration district, Newport, Mon.

Registration sub-districts, Mynyddyslwyn, and St. Woollos, Newport.

Amount expended upon sewerage works during past 10 years, 200*l.*

The Risca Urban District is situate in the lower portion of the Ebbw Valley, being bounded on the north by the Abercarn Urban District, and elsewhere by the St. Mellons Rural District. The Sirhowy River flows through the district in a direction from west to east, and at North Risca joins the Ebbw River. The dwellings in the district may be broadly regarded as distributed in two main groups, namely, the Cross Keys, Pontywain, and North Risca group in the north, and the Risca and Pontymister group at the south-east. The chief industries consist of coal mining, tin-plate and iron working, and brick making ; there being within the district two collieries, namely, the New Risca Colliery and the Old Risca Colliery, both working steam coal ; the Pontymister Iron Foundry ; and three brick works. Building is going on briskly, and, in view of the large quantity of coal which remains to be worked in this district, considerable increase in the population may be anticipated.

Sewerage and Drainage.—No system of sewerage has been carried out. Except for the fact of a few short lengths of pipe-sewer which have been recently put down by the Urban District Council in certain parts of the district, matters in this respect remain much as they were at the date (1893) of the visit of my colleague, Dr. Fletcher. Existing sewers thus consist of varying lengths of pipe sewer, of old stone culverts, and of box drains. Certain parts of the district are without sewers of any kind. At Back-lane, Pontywain, for example, owing to the absence of sewerage, slop sewage finds its way down irregular channels of its own making in this ill-kept road. In various other parts of the district houses are still left to drain independently, or in groups, into neighbouring ditches, brooks, or into the river ; and, as a consequence, sewage nuisances abound. In many parts of the district house drainage is of a very defective character, consisting of imperfectly trapped box drains, or of badly-constructed open channels in which slop sewage may be seen standing in pools. Many houses are unprovided with drainage of any kind, slops in such cases being thrown either into watercourses, or upon the gardens ; in some instances, where they are allowed to accumulate in the neighbourhood of dwellings, they cause nuisance.

Sewage Disposal.—Except where individual houses, or groups of houses, are drained into cesspools, practically all the slop sewage of this district is discharged “untreated” either directly into the river, or indirectly by way of its tributaries, such as the Risca and Waterlane brooks. These brooks, which pass in proximity to dwellings, are, owing to their seriously polluted condition, productive of considerable nuisance.

Excrement and Refuse Disposal.—Excrement disposal is mostly accomplished by cess-pit privies, the duty of cleansing which is left to the tenants. In some cases the garden space available for the disposal of the excrement is very limited. In one instance I found the contents of the privy of a house in which there was at the time a suspected case of enteric fever, had recently been deposited in a hole in the garden within a few yards of a dip-well used for drinking purposes by a number of neighbouring cottagers. In some other cases privies discharge into a field, causing nuisance ; some discharge directly into brooks.

Water Supply.—A considerable number of the inhabitants still depend upon local supplies from springs and wells, many of which, judging from those inspected, are probably liable to pollution. The remainder of the population, however, are supplied by the Monmouthshire Valleys Gas and Water Company, which was established in 1891 for the supply of Risca. The water, which is believed to be of good quality, is obtained from a gathering ground about 800 acres in extent on the side of the Mynyddyslwyn Mountain. The supply appears to be deficient in dry summers, and the Company contemplate the construction of increased storage accommodation.

River Pollution.—The river is extensively polluted in this district by slop sewage, and also receives a certain amount of excrement from privies discharging into its tributaries as well as the drainage from slaughter-houses and pig-sties. The Pontymister Tin-Plate Works, which formerly discharged their waste pickle into the river, have recently provided tanks for recovering the waste acid and iron as copperas.

The urgent need for a proper system of sewerage for this district would appear to be locally admitted, from the fact of the Urban District Council having appointed a joint committee with the Abercarn Urban District Council, for the consideration of a joint scheme of sewerage and sewage disposal for the two districts. (See Abercarn Urban District, pages 36 and 37.)

There would not appear in this district to be any special engineering difficulties in regard to a main trunk sewer for the Ebbw and Sirhowy valleys. There has been some subsidence from undermining at Pontywain, but none apparently along the course of the river.

APPENDIX III.

EBBW FAWR RIVER AREA.

<i>Districts West of River.</i>		<i>Districts East of River.</i>	
	Pages.		Pages.
Ebbw Vale, Urban - - - - -	- 29-31	Ebbw Vale, Urban - - - - -	- 29-31
Abercarn, Urban (small portion, at extreme south, only) - - - - -	- 36-37	Abertillery, Urban (small portion, at extreme south, only) - - - - -	- 34-35

EBBW VALE URBAN DISTRICT.

Date of formation, April 1874.
Area, 6,403 acres.
Population, 1881—14,700 ; 1891—17,025.
Inhabited houses, 1881—2,729 ; 1891—3,059.
[Since 1891 Llandafal (population about 300) has been added to the South Ward of this district.]
Annual assessable value, 48,132*l.* General district rate, 1893-94, 2*s.* 3*d.* in the £.
Balance of outstanding loans under Sanitary Acts, 45,151*l.* (January 1896).
Balance of outstanding loans under other Acts, nil.
Registration districts, Bedwellty and Crickhowell.
Registration sub-districts, Aberystroth, Tredegar, Llangynidr, Llanelly.
Amount expended upon sewerage works during the past 10 years, (?).

This district extends from a point about three-quarters of a mile above the Merthyr, Tredegar, and Abergavenny Branch of the London and North Western Railway in the north, to within about 50 yards of the junction of the Ebbw Fawr and Ebbw Fach rivers in the south, a distance of between eight and nine miles. Throughout that distance it occupies both banks of the Ebbw Fawr except for about a quarter of a mile in the extreme south, where it occupies the east bank only, the west bank being within the Abercarn Urban District. It is bounded on the north by the Crickhowell Rural District (Brecknockshire), on the south by the Abercarn Urban District, on the east by the Nantyglo and Blaina and Abertillery Urban Districts, and on the west by the Tredegar and Bedwellty Urban Districts. The Beaufort Ward, which comprises part of the parishes of Llangynidr and Llangattock, is in the county of Brecknockshire ; the remainder is in that of Monmouthshire.

The chief centres of population are as follows :—

East side of River :											Approximate Population.
Beaufort	-	-	-	-	-	-	-	-	-	-	2,740
New Church	-	-	-	-	-	-	-	-	-	-	100
New Town	-	-	-	-	-	-	-	-	-	-	3,000
Steelworks	-	-	-	-	-	-	-	-	-	-	250
Cwm, part of	-	-	-	-	-	-	-	-	-	-	350
Graig Fawr	-	-	-	-	-	-	-	-	-	-	250
Llandafal	-	-	-	-	-	-	-	-	-	-	300
Waun Llwyd	-	-	-	-	-	-	-	-	-	-	500
West side of River :											
Rassau	-	-	-	-	-	-	-	-	-	-	800
Shop Row	-	-	-	-	-	-	-	-	-	-	50
Chapel Town	-	-	-	-	-	-	-	-	-	-	3,500
Church Town and Briery Hill	-	-	-	-	-	-	-	-	-	-	4,500
Victoria	-	-	-	-	-	-	-	-	-	-	1,500

Beaufort and Rassau, which together constitute the Beaufort Ward, comprise the most northerly aggregation of dwellings in the district, there being only some dozen scattered

cottages higher up the valley. With the exception of New Church and Shop Row on the east and west of the river respectively, there is practically no population for the next three-quarters of a mile till the main centre of population, Ebbw Vale (New Town, Chapel Town, Church Town, and Briery Hill), is reached. Almost continuously with Briery Hill, Victoria extends in a straggling fashion for a mile or so on the west side of the river. Below Victoria there is practically no centre of population on this side of the river. The east side of the river is almost unpopulated from New Town to Waun Llwyd. South of Waun Llwyd are situate the villages of Cwm and Llandafal. Near the latter, building is going on somewhat energetically at Graig Fawr, where a new colliery has recently been opened.

The chief industries of the district are coal mining and iron and steel working. Coal mining has been carried on for many years in this neighbourhood, and there are at present six collieries working steam coal; four in the northern half of the district, between Beaufort and Victoria, and two in the south at Waun Llwyd and Graig Fawr (near Llandafal) respectively. There are also important iron and steel works in the district. All the collieries, as well as the iron and steel works, belong to the Ebbw Vale Steel Iron and Coal Company, Limited. In regard to trade prospects, there is a vast quantity of steam coal to be worked, especially in the southern portion of the district where the pits are of more recent date, the Graig Fawr Pit only having been opened some three years ago

The iron and steel works are still working, but this trade is said to be in anything but a flourishing condition.

Sewerage and Drainage.—There is no regular system of sewerage in the district. Existing “sewers” consist mostly of old stone barrel culverts, put down many years ago by the Colliery Company, mainly, no doubt, for the conveyance of storm water. The course of these main culverts has been traced from point to point, but is not completely ascertained. It is known, however, that they not unfrequently pass under dwellings. No special arrangements have been made for ventilating them, though they are said to be mostly open at their highest points, where they take in water from “feeders” for flushing purposes. Owing to their steep gradients—for speaking generally they appear to pass down the slopes of the valley more or less at right angles to the river—and to the flushing obtained from “feeders,” it is locally thought that but little deposit can take place in them. In certain localities, as, for instance, Lower Beaufort and Rassau, old brick and stone box drains serve for sewers. In other places, however, such as the more modern villages of Waun Llwyd and Graig Fawr (Tallistown), the sewers are of a very different character, consisting of glazed socketed stoneware pipes, with cemented joints and open manhole gratings for ventilation. Varying lengths of similar pipe sewer have also recently been provided elsewhere, such as at Upper Beaufort and Market Street, Chapel Town.

Although of a satisfactory character in the case of the newer and better class houses, house drainage of the numerous working class dwellings of the older type is of a highly defective character. Such houses commonly depend for slop drainage upon imperfectly trapped box drains or on irregularly laid open channels, and in not a few instances slop sewage was found standing about in pools in the vicinity of dwellings.

Sewage Disposal.—Except where, as in the case of part of Beaufort Hill, sewage is turned into pits formed among old shale heaps, or otherwise locally disposed of, practically all the liquid sewage of this district finds its way “untreated,” directly or indirectly, into the river Ebbw Fawr. With regard to Beaufort, however, it has to be mentioned that sewage from the upper part of Beaufort Hill is discharged into one of the series of trade reservoirs which communicate with the Ebbw Fach river. The sewage of some 50 other houses at Beaufort is discharged into a shallow roadside pond situate within some 20 yards of a row of dwellings.

Excrement and Refuse Disposal.—Since the inspection of this district by the late Mr. Spear in the year 1882, the dry ash system for excrement disposal has been very largely adopted. An ash closet, consisting of a closet with a movable receptacle (metal pail), and provided with a cinder sifter, has in the majority of instances been substituted for the highly objectionable privies formerly in use in this district. A certain number of old privies, however, still exist. In a number of instances the pails of the ash closets were found to be missing at the time of my visit; the closets being consequently used as privies with fixed receptacles, for which purpose they are not suitably constructed. It appears, moreover, that the provision of cinder sifters is not now insisted upon, which, as the Medical Officer of Health points out in his annual report for 1894, is likely to imperil the usefulness of the system. The ash closets are cleansed twice weekly by the District Council’s contractors, who also remove house refuse from premises daily. The excrement, ashes, and house refuse thus removed are finally disposed of at “tips” provided by the District Council. It is stated, however, that the available “tipping” ground is nearly used up.

Water Supply.—The district is supplied with water by the works of the Urban District Council which were opened in 1887. The water is obtained from a moorland gathering ground of between two and three square miles in extent, and is collected in a reservoir of some 60,000,000 gallons capacity (storage for about 120 days). After being passed

through settling tanks and sand and gravel filters, the water is distributed by gravitation to the district in iron mains; the service is constant, and there has never, it is said, been occasion to intermit the supply, except locally for repairs. The water is soft, and dissolves lead, but is otherwise believed to be of good quality and abundant in quantity; the average daily supply is from 18 to 20 gallons per head. This water is supplied to the whole of the district north of Cwm; it is also supplied to the Nantyglo and Blaina Urban District and to the Sirhowy portion of the Tredegar Urban District. Cwm and Llandafal are at present dependent upon local sources of supply.

River Pollution.—For the first mile and a-half of its course the Ebbw Fawr appears to be free from any source of sewage contamination, and during the next three-quarters of a mile it receives only the slop sewage from about a dozen cottages which are scattered along its banks. Shortly after its passage under the Merthyr, Tredegar, and Abergavenny Branch of the London and North Western Railway, however, it is joined by the Rassau Brook, which brings to it the sewage of Rassau; and here its systematic pollution commences. Henceforward the river receives almost the whole of the liquid sewage of the district; it is also seriously polluted by the waste water from the coal washery which is carried on at certain pits where the effluent was found at the time of my visit to be literally as black as ink. Notwithstanding, therefore, the dry method of excrement disposal which is adopted in this district, the river is very seriously polluted by sewage.

Points in regard to the Disposal of Sewage.—There are some few plots of land abutting on the river which might perhaps serve for the disposal of sewage in this district. Thus there are several grass fields having a collective area of some 25 acres alongside of the river just below Waun Llwyd. This land would of course not be available, apart from pumping, for the sewage of the southern portion of the district where, owing to the development in coal mining operations, population is likely to increase. There are, however, one or two other small plots of similar land of some two or three acres each below Cwm and Llandafal, which might possibly serve for sewage disposal, though such a multiplication of outfall works for one district as this method would involve, is certainly to be avoided if better means could be devised. In carrying a main sewer down this valley it might be necessary, owing to the fact of the river being culverted over, as it is, for a short distance at Chapel Town Steel Works and Waun Llwyd, or to its being closely flanked by slag heaps as at No. 5 pit, to carry the sewer in iron pipes along the bed of the river. There has been some subsidence on the sides of the hill, as at Waun Llwyd, but apparently none in the neighbourhood of the river, and no special difficulty in regard to a main trunk sewer is anticipated from this cause by the Surveyor.

ABERCARN URBAN DISTRICT (small portion of).

[See Appendix V., pages 36 and 37.]

ABERTILLERY URBAN DISTRICT (small portion of).

[See Appendix IV., pages 34 and 35.]

APPENDIX IV.

EBBW FACH RIVER AREA.

<i>Districts West of River.</i>				<i>Districts East of River.</i>			
			Pages.				Pages.
Nantyglo and Blaina, Urban	-	-	31-33	Nantyglo and Blaina, Urban	-	-	31-33
Abertillery, Urban	-	-	34-35	Abertillery, Urban	-	-	34-35

NANTYGLO AND BLAINA URBAN DISTRICT.

Date of formation, January 1886.
Area, 3,860 acres.
Population, 1881—9,267; 1891—12,410.
Inhabited houses, 1881—1,812; 1891—2,156.
Annual assessable value, 45,768*l.* General district rate, 1*s.* 7*d.* in the £. (1893-94).
Balance of outstanding loans under Sanitary Acts, 9,948*l.* 13*s.* 4*d.*, for water supply, new road, and cemetery.
Balance of outstanding loans under other Acts (?).
Registration district, Bedwellty.
Registration sub-district, Aberystroth.
Amount expended upon sewerage works during the past 10 years (?).

The Nantyglo and Blaina Urban District, which lies at the head of the Ebbw Fach Valley, is situate between the Brynmawr Urban District (Brecknockshire) on the north, the Abertillery Urban District on the south, the Blaenavon Urban District on the east, and the Ebbw Vale Urban District on the west. It occupies both sides of the Ebbw Fach River for a distance of some miles. The dwellings within the district are for the most part aggregated in the following centres :—

	Approximate Population.
Nantyglo - - - - -	2,500
Garnfach - - - - -	2,750
Blaina - - - - -	6,250

The inhabitants are mostly engaged in coal mining, iron working, and tin-plate working. There are within the district five collieries, four of which (two at Nantyglo, and two at Blaina) are working steam coal, while the fifth consists of a “level” working a little house coal. The iron works are the Pyle and Blaina Furnace Company’s Works and an iron foundry at Blaina. The tin-plate trade comprises the Lion Tin-Plate Works at Nantyglo, and the Blaina Iron and Tin-Plate Company’s Works at Blaina. The future prospects of trade generally are not regarded as hopeful, though the Lion Tin-Plate Works which had been closed for some two years had owing apparently to a slight improvement in the tin-plate trade been recently re-opened at the time of my visit.* Coal mining is being extensively carried on, but it is considered by some authorities that the coal will be worked out in 20 years or so. Though a considerable increase in the population took place between the censuses of 1881 and 1891, there does not appear to be much building going on at present, and it is stated that the value of house property is beginning to fall.

Sewerage and Drainage.—Except in the case of groups of outlying houses, the most important of which appears to be Winchestown on the west of the river at Nantyglo, and which is now being sewered by the Urban District Council, practically the whole of the district is sewered in one or other fashion. No complete system of sewerage, has, however, been carried out; different localities having been sewered from time to time. The older sewers consist of old stone or brick barrel drains and arched culverts put down very many years ago. The newer sewers which have been put down by the Urban Authority consist of glazed, socketed, stoneware pipes with for the most part clay-joints, though more recently cement-joints have been used. The more modern sewers are ventilated by street level ventilators, and by up-cast shafts at their dead ends; they are said to be flushed from time to time through the man-holes. The old barrel sewers, which in some localities pass under dwellings, are ventilated mainly through the storm-water gratings at the sides of the streets, though a few lamp-holes fitted with open street-level gratings have been provided in their course. These old sewers are mostly open at their upper ends. They are said to be flushed occasionally by the overflow from the “feeders to the works.” House drainage is in many cases of a defective character. The more modern house drains consist of socketed pipes; they are sometimes trapped with stoneware gulleys, though iron lip-traps are in common use. Older house drains, however, consist in many cases of box-drains, or of defective open channels, and some houses are unprovided with slop drainage of any kind. The house drainage at Winchestown is especially defective. The District Council appear, however, to be taking action with a view to the improvement of house drainage, and I am informed that, as a result, some 1,760 feet of glazed pipe-drains have been put down by owners of property during the last year.

Sewage Disposal.—No arrangements have been made for the purification of sewage, which, as a consequence, finds its way “untreated” into the Ebbw Fach River; either directly through the various sewers which discharge into that river, or indirectly, as for instance through the Ystrwth Brook. This brook, which passes in proximity to dwellings, receives the sewage of some 150 houses, and is in a very offensive condition. The Urban District Council have, however, a scheme in hand for re-sewering this group of dwellings to a main sewer consisting of iron pipes, which will be carried down the brook in question.

Excrement and Refuse Disposal.—For excrement disposal water-closets, either long or short hopper (commonly the former), with pans and traps, are in general use. At outlying houses, as at Winchestown, old privies still exist. The pan and trap closets are mostly dependent upon hand flushing, and some of the pans inspected were in a very foul condition. Ashes and house refuse are in most cases collected in buckets or boxes, but open iron ash-bins have been provided for public use in certain localities. Such refuse is removed by the District Council’s contractors, daily in the more thickly populated localities, and weekly in the case of outlying groups of houses. Scavenging by the contractors is stated to have been formerly much neglected, and, although it appears to have been more regularly carried out of late, the District Council have decided, with a view to ensuring greater efficiency of the work, to undertake it by their own staff after 31st March 1896.

* I understand that these works have, however, since been again closed.

Water Supply.—The district is supplied with water by the Ebbw Vale Urban District Council, and this water, which is laid on to practically all the houses, is said to be plentiful and of good quality. The supply is constant, and has never, it is stated, been intermitted, except locally for repairs. During the year 1894 the average supply, exclusive of that used for trade purposes, was 10 gallons a head per day, but more could, it is said, be had if required.

Pollution of the River.—At its very commencement in this district the Ebbw Fach is polluted by sewage from certain houses in the Brynmawr and Ebbw Vale Urban Districts, which reaches it indirectly through certain trade ponds or reservoirs communicating with the river. Subsequently, in its course through the Nantyglo and Blaina Urban District, the river receives practically the whole of the crude sewage, including excrement, of the district, and is further seriously polluted by trade refuse, and to some extent by the tipping of ashes and coal-screen. The most important trade refuse finding its way into the river consists of the waste “pickle” from both the tin-plate works, of the waste water from coal washing which is carried on at three separate washeries, and of the gas liquor from the Brynmawr and Blaina Gas Company. At the time of my visit no attempt had been made to diminish the polluting quality of the waste pickle from either of the tin-plate works, though it was stated that tanks were in each case about to be provided for the purpose of crystallizing the sulphate of iron contained in it.* As regards coal washing, measures calculated to largely diminish the pollution of the river from this cause are adopted at each of the three washeries in the district. The water is in each case used again and again, and tanks are provided into which it is passed before finally being discharged into the river. At the North Blaina Colliery, however, which I chanced to visit just as the coal washing had ceased for the day and when the water was being discharged into the settling tank, I found that owing to the fact of the tank, which is of small size, having been allowed to become nearly full of sediment as a result of previous operations, and, apparently, owing also to the fact of the tank outlet being out of repair, the water was passing straight through the tank on its way to the river, under circumstances admitting of little, if any, deposition of its contained coal and shale detritus. At the washery of the Pyle and Blaina Furnace Company I found a certain, though not a large, amount of very black water (the sulphur water) passing continuously through the tank into the sewer, instead of being collected in the tank with a view to subsidence; but I was given to understand that steps should be taken to remedy this for the future. At the Brynmawr and Blaina Company’s gasworks I found that the gas liquor had been discharged into a ditch, and was finding its way into the river.

As might be expected from what I have recorded, the Ebbw Fach was found to be in a very foul condition. Immediately below the Lion Tin-Plate Works, the water was of a dirty reddish tinge; lower down, after it had received the sewage of the district and the waste water from the coal washing, it was found to be almost as black as ink.

Points bearing upon possible methods of Sewage Disposal.—Between the Blaina gasworks and the South Griffin pit there are a number of meadows along the banks of the river which, as regards level, would, the Surveyor considers, be suitable for the treatment of all the sewage in the district.

In carrying a main sewer through this district some engineering difficulties might be met with, especially if the course of the river were followed. For in its passage through the district the river, which is a narrow shallow stream, is covered in (arched over with brick) for considerable distances at various points as it passes under different works, slag-heaps, and railway sidings. The sewer could, no doubt, be carried in iron pipes along the bed of the river through the tunnels in question. In some instances, however, these brick tunnels, which have to carry considerable weight, are only two bricks thick, and doubts are entertained as to their stability. Inconvenience would also, in all probability, be met with owing to the subsidence of the ground which is taking place, especially at Blaina, both in the main road and in the bed of the river, to a somewhat serious extent. These difficulties, however, are not to be regarded as exclusively associating themselves with a main system of sewerage for the Ebbw Valleys, for they would presumably, to a great extent, have to be faced also in connexion with any comprehensive scheme of sewerage and sewage disposal for this district alone.

* One of these works has, I understand, been since temporarily closed.

ABERTILLERY URBAN DISTRICT.

Date of formation, January 1887.

Area, 6,658 acres.

Population, 1881, 6,003 ; 1891, 9,138.

Inhabited houses, 1881, 1,090 ; 1891, 1,471.

[Extension of district by inclusion of parish of Llanhilleth (population 2,333), 10th March 1893.]

Annual assessable value, 40,626*l.* General district rate, 2*s.* in the £. in 1893-94.

Balance of outstanding loans under Sanitary Acts } 46,777*l.*, including gas and water
Balance of outstanding loans under other Acts } works.

Registration districts, Bedwellty and Pontypool.

Registration sub-districts, Aberystruth and Llanhilleth.

Amount expended upon sewerage works during the past ten years, .

This Urban District is situated mainly in the Ebbw Fach Valley, though it now extends southwards into the valley of the main river Ebbw. It is bounded on the north by the Nantyglo and Blaina Urban District ; on the south by the Abercarn Urban District ; on the east by the Blaenavon and Abersychan Urban Districts ; and on the west by the Ebbw Vale and Abercarn Urban Districts, from the latter of which it is separated by the Ebbw River. From its northern boundary to Aberberg, a distance of some five miles, it occupies both sides of the Ebbw Fach, while from Aberberg to Crumlin, a distance of three miles, it occupies the east bank of the main River Ebbw. The north-eastern portion of the district occupies the valley of the Cwm-Tillery, an important tributary which joins the Ebbw Fach at Abertillery. The valleys in which this district is situate are for the most part narrow and deep, being flanked by steep Pennant ridges of considerable height.

The chief centres of population are :											Approximate Population.
Abertillery	-	-	-	-	-	-	-	-	-	-	6,000
Cwm-Tillery	-	-	-	-	-	-	-	-	-	-	3,080
Six Bells	-	-	-	-	-	-	-	-	-	-	700
Aberberg	-	-	-	-	-	-	-	-	-	-	350
Llanhilleth	-	-	-	-	-	-	-	-	-	-	2,300
Crumlin	-	-	-	-	-	-	-	-	-	-	200

The population is mainly engaged in coal mining, which is extensively carried on both in the Cwm-Tillery and Ebbw Fach valleys ; and mining is likely to undergo considerable further development, especially in the southern part of the district, where the steam coal has only been opened up during the last few years. In view of the vast quantity of coal still remaining to be worked it is, indeed, considered that this Urban District will be the scene of active coal mining operations for a hundred years to come.

Sewerage and House Drainage.—Although no system of main sewerage has yet been carried out for this district, considerable progress has nevertheless been made during recent years in the provision of glazed socketed pipe sewers for the different centres of population and outlying groups of dwellings. Thus Abertillery, which was originally drained by old stone culverts, is now said to be sewered throughout with glazed stoneware socketed pipes having cemented joints. At Cwm-Tillery, Six Bells, Aberberg, Llanhilleth, and Crumlin, varying lengths of similar pipe sewers have also been provided, and although in some of these localities certain groups of dwellings are at present unprovided for in this respect, I understand that schemes for sewerage them have been decided upon, and are indeed being proceeded with. In Abertillery the sewers are mainly ventilated by the road gulleys, which are left untrapped for the purpose, though some of the manholes are provided with open gratings, and there are also a few upcast shafts against houses. Elsewhere the modern sewers are ventilated by means of open gratings to the manholes. Storm water is relied upon for flushing sewers, except in the case of one or two sewers with flat gradients which are flushed by automatic tanks.

House drains consist mostly of glazed pipes, sometimes trapped with stoneware gulleys though more frequently with iron lip-traps. In certain instances, however, defective open channels still do duty for slop drainage.

Sewage Disposal.—Owing to the absence of any system of main sewerage and outfall works, the river receives “untreated” practically the whole of the sewage of the district, including much excrement which is discharged into it directly or through its tributaries by a number of independent sewer outfalls and house drains.

Excrement and Refuse Disposal.—Excrement disposal is for the most part carried out upon the water carriage system, though in certain parts of the district pail closets, cinder closets, and privies are to be met with. The water closets consist mostly of short hopper pans with siphons, and as a rule are dependent upon hand flushing, though it is

hoped that when the new water scheme is completed such closets will generally be provided with water for flushing purposes. The scavenging of pail closets, cinder closets, and privies is left to the owners and tenants. Ashes and house refuse are collected in buckets and other receptacles and removed by the District Council. Such scavenging is carried out daily in Abertillery, and three times a week in other parts of the district.

Water Supply.—Until September 1894 the district was supplied by the Brynmawr and Abertillery Gas and Water Company with water obtained from mountain springs in the Ebbw Fach Valley. Owing to the deficiency of this supply the Company adopted a scheme for augmenting it by an independent supply from the upper part of the Cwm-Tillery, a stream fed by an extensive moorland gathering ground on the mountains at the head of the Cwm-Tillery Valley. This scheme consisted of piping the water from the stream to some sand and gravel filter beds, and thence to a service tank, from which it was to be supplied in iron mains by gravitation to the district. A large compensation reservoir was also to be provided. Subsequently the Urban District Council (then the Local Board) obtained an Act of Parliament authorising them to purchase the whole of the Company's water interest (and the gas interest as regards Abertillery), which purchase has since been completed. The work has so far progressed that water is already laid on to Abertillery and some part of Cwm-Tillery from this new service. At present, however, the water is supplied direct from the river, the filter beds and reservoirs having not yet been constructed. Contracts have also been let for laying the mains down the whole of the valley to the lower end of Llanhilleth, by which means the chief centres of population south of Abertillery, which have hitherto had to depend upon local springs, will be supplied from this new service.* This new supply is believed to be free from risk of pollution at its source, and is estimated to afford a daily supply of 20 gallons per head for a population of 20,000 persons.

River Pollution.—It has been seen that the Ebbw Fach as it passes through this district is extensively polluted by sewage. At the time of my visit it was also being seriously polluted by the Abertillery Tin-Plate Works, where the whole of the waste pickle was being turned undealt with into the river. I was informed, however, that the erection of copperas tanks was in contemplation.† The river is also somewhat seriously polluted by the coal washing which is carried on in the Cwm-Tillery Valley, for although settling tanks had been provided with a view to recovering the suspended coal detritus in the waste water from the washery a considerable quantity of this detritus was nevertheless at the time of my visit escaping into the brook.

Points in regard to the Disposal of Sewage.—Owing to the narrowness of this valley there is very little land available for sewage disposal unless expensive pumping operations are to be undertaken; indeed, the only land I observed which seemed as regards level to offer any prospect of suitability for that purpose consisted of some 20 acres of meadow land on the east side of the river above Llanhilleth. This land would not, however, take the sewage of the lower part of the district, where a considerable population is growing up, and in the opinion of the Surveyor to the District Council it is for other reasons unsuitable. There appears to have been no subsidence as a result of coal mining in this district of a kind to injure a main trunk sewer. Nor is it anticipated that any such subsidence is likely to occur, at all events for many years to come, owing to the depth of the coal seams in this region. There do not appear to be in this district any special engineering difficulties in regard to the construction of a main trunk sewer.

* I understand that since the above was written this main has been laid down.

† I understand that these works have since been closed.

APPENDIX V.

EBBW (MAIN) RIVER AREA.

<i>Districts West of River.</i>						<i>Districts East of River.</i>					
					Pages.						Pages.
Abercarn, Urban	-	-	-	-	- 36-37	Abertillery, Urban	-	-	-	-	- 34-35
Risca, Urban	-	-	-	-	- 28-29	Abercarn, Urban	-	-	-	-	- 36-37
St. Mellons, Rural	-	-	-	-	- 21-23	Risca, Urban	-	-	-	-	- 28-29
						St. Mellons, Rural	-	-	-	-	- 21-23
						Newport, Urban	-	-	-	-	- 37

ABERTILLERY URBAN DISTRICT.

[See Appendix IV., pages 34 and 35.]

ABERCARN URBAN DISTRICT.

Date of formation, March 1892.

Area, 9,504 acres.

Population, 1881, 5,964 ; 1891, 10,464.

Inhabited houses, 1881, 1,147 ; 1891, 1,823.

Annual assessable value, 34,253*l.* (September 1895). General district rate, 1*s.* 6*d.* in the *£.* (1893-94).Balance of outstanding loans under Sanitary Acts, 4,436*l.*, at Lady Day 1894.

Balance of outstanding loans under other Acts, nil.

Registration Districts, Newport, Pontypool.

Registration sub-districts, Mynyddyslwyn, Pontypool.

Amount expended upon sewerage works since formation of district, nil. [220*l.* about to be expended out of revenue.]

This Urban District, which is situate in the Ebbw Valley, is bounded on the north by the Bedwellty, Ebbw Vale, Abertillery, and Abersychan Urban Districts; on the south by the Risca Urban and St. Mellons Rural Districts; on the east by the Panteg, Llanfrechfa Upper, and Llantarnam Urban Districts; and on the west by the St. Mellons Rural District. In the north it occupies the west bank of the main River Ebbw from Aberberg to Crumlin, a distance of some three miles, while south of Crumlin it occupies both banks of that river for a similar distance. In the extreme south it abuts on the east bank of the river only for about a mile.

The chief centres of population are Crumlin, Newbridge (including Trecelyn), and Abercarn, the inhabitants of which places are mostly engaged in coal-mining. There are two collieries near Abercarn, working steam coal at depths of 280 and 375 yards respectively, and there are also within the district one small pit and several "levels" working the more superficial Mynyddyslwyn house coal. As regards other industries, the Abercarn Tin-Plate Works, which formerly employed a considerable number of persons, were closed some three years ago, but there is still a small iron foundry in the district.

The coal-mining prospects here appear to be particularly good. It is considered that at each of the deep collieries there is sufficient coal to last 100 years at the present rate of working, while there is a considerable area in the district over which the steam coal has not yet been opened up; indeed, as I was informed, there is still one "taking" of between 3,000 and 4,000 acres unlet. A further considerable increase in population may therefore be anticipated.

There are said to be good beds of fire-clay in the district which may be worked in the future.

Sewerage and Drainage.—No definite system of sewerage has yet been carried out in this district. Existing "sewers," consist of old stone culverts, of box drains, and of varying lengths of socketed pipe sewer put down during more recent years by the owners of property for the drainage of different groups of dwellings. Even these more recent sewers appear to be unprovided with proper arrangements for ventilation, and, judging from one which afforded unusual facilities for inspection, are of very defective construction. This sewer, which was put down by the owner some four years ago for the drainage of a new terrace of houses, was so superficially laid that the crowns of the pipes were uncovered for a considerable distance, as a result of which one or two of them were broken. The sewer was, moreover, irregularly laid both as regards direction and gradient, and was imperfectly jointed; while the branch drains which joined it at right angles were not connected by proper junctions, but by the simple expedient of knocking holes into it.

House drainage consists mostly of open slop channels, but sometimes of socketed pipes and sometimes of old box drains, which occasionally pass under houses. The open channels are usually fairly well constructed of brick or tile, but they are in many cases very close to the backs of houses and are liable to give rise to nuisance, owing to the accumulation and decomposition of slop sewage when any obstruction occurs in their course owing to irregularity of brickwork or other cause. Many complaints were made to me by tenants of nuisance of this kind. At Crumlin the house drainage, which consists in many cases of box drains and sometimes of mere open channels in the soil, is especially defective.

As regards trapping, stoneware gulleys have been provided in some cases, but house drains are very frequently trapped with iron lip-traps ; occasionally they are altogether untrapped.

Sewage Disposal.—Except in the case of a few groups of houses which are drained to cesspools, practically all liquid sewage is discharged “untreated” either into the River Ebbw or its tributaries, or into the Monmouthshire Canal which passes through the district. Overflows from the cesspools, in some cases at least, also discharge into the canal.

Excrement and Refuse Disposal.—Excrement is mostly disposed of by pail closets, though not a few old privies still exist in the district, some of which discharge directly into the River Ebbw or its tributary brooks. The cleansing of pail closets and the removal of ashes and house refuse have until recently been carried out under contract with the District Council. The result being found to be unsatisfactory, the Council had, at the time of my visit, just commenced to carry out the scavenging by their own staff. That improvement was necessary was evident from the heaps of ashes I found lying about in certain localities. It is now, however, proposed to remove all refuse from house premises, and to cleanse all privy pails, every other day.

Water Supply.—The district is supplied by the District Council with water obtained from springs in the Pennant rock and collected in reservoirs, from which it is delivered by gravitation to all parts of the district, except a few groups of houses situate at too high a level. The supply appears to have been deficient during the last few summers, as evidenced by the need of intermitting the ordinarily constant service. This deficiency is believed to have been due mainly to leakage of the principal reservoir, to remedy which measures have already been taken, but partly also to deficient yield of the springs. There is, however, said to be ample water available, and the Council are about to augment their supply by the use of additional springs.

River Pollution.—Owing to the absence of any proper system of sewerage and sewage disposal the river is very seriously polluted with sewage in this district. Its tributary, the Cwm Torlus Brook, which conveys the sewage of Trecelyn (over 300 houses), is best described as an open sewer. Coal washing as carried out at the Upper Abercarn Pit adds little, if at all, to pollution of the river.

It would appear, however, that the Urban District Council fully realise the importance of remedying the present polluted condition of the Ebbw River, and, as I was given to understand, they regard a joint system of main trunk sewers for the whole of the Ebbw valley as the proper solution of the matter. But, lest such a scheme should be found impracticable, they some time ago appointed a committee, conjointly with the Risca Urban Council, to consider the practicability of a joint system of sewerage and sewage disposal for the two districts. Under instructions from this committee the Surveyor to the Abercarn District has prepared a scheme of main sewerage for these districts to an outfall on some 26 acres of land in the St. Mellons Rural District, just below Pontymister, where it is proposed to treat the sewage by chemical precipitants and subsequently by intermittent downward filtration.

RISCA URBAN DISTRICT.

[See Appendix II., pages 28 and 29.]

ST. MELLONS RURAL DISTRICT.

[See Appendix I., pages 21, 22, and 23.]

[NEWPORT URBAN DISTRICT.—This district abuts upon the main Ebbw River, for a distance of about four miles, as it winds through the alluvial flats to its confluence with the river Usk, just before the latter enters the Severn. The borough of Newport is, however, wholly drained into the Usk, and the Ebbw does not appear to be subject to pollution in this part of its course.]

APPENDIX VI.

AFON LLWYD RIVER AREA.

<i>Districts West of River.</i>						<i>Districts East of River.</i>					
					Pages.						Pages.
Blaenavon, Urban	-	-	-	-	- 38-39	Blaenavon, Urban	-	-	-	-	- 38-39
Abersychan, Urban	-	-	-	-	- 39-41	Abersychan, Urban	-	-	-	-	- 39-41
Pontypool, Urban	-	-	-	-	- 41-42	Pontypool, Urban	-	-	-	-	- 41-42
Panteg, Urban	-	-	-	-	- 42-44	Panteg, Urban	-	-	-	-	- 42-44
Llanfrechfa Upper, Urban	-	-	-	-	- 44-46	Pontypool, Rural	-	-	-	-	- 48
Llantarnam, Urban	-	-	-	-	- 46-48	Magor, Rural	-	-	-	-	- 49
Magor, Rural	-	-	-	-	- 49						
Caerleon, Urban	-	-	-	-	- 49						

BLAENAVON URBAN DISTRICT.

Date of formation, February 1860.

Area, 4,606 acres.

Population, 1881, 9,522 ; 1891, 11,452.

Inhabited houses, 1881, 1,857 ; 1891, 2,085.

Annual assessable value, 28,561*l.* General district rate, 1*s.* 6*d.* in the £. (1893-94).

Balance of outstanding loans under Sanitary Acts, 2,907*l.*, Lady Day 1894.

Balance of outstanding loans under other Acts, nil.

Registration districts, Abergavenny, Bedwellty, Pontypool.

Registration sub-districts, Blaenavon, Aberystroth, Pontypool.

Amount expended upon sewerage works during the past 10 years, 1,278*l.* 12*s.*

This district, which lies at the head of the Afon Llwyd Valley, is bounded on the north by the Crickhowell and Abergavenny Rural Districts, on the south by the Abersychan Urban District, on the east by the Abergavenny Rural District, and on the west by the Nantyglo and Blaina and the Abertillery Urban Districts. It occupies both sides of the Afon Llwyd River for about three miles from its source, while in the south, for a distance of about a mile, it occupies the east side only of that river, which here separates it from the Abersychan Urban District. The chief centre of population is the town of Blaenavon (approximate population some 9,500), but there are also several detached groups of dwellings, such as Garn-yr-erw (approximate population 600), which lies on the east of the river towards the north of the district, and Forge-Side (approximate population 1,000), which lies on the west of the river, some half-mile to the north-west of Blaenavon.

Apart from those engaged in the ordinary occupations of a town, the inhabitants are, for the most part, employed in the collieries and iron and steel works belonging to the Blaenavon Company, Limited. That Company possess nine furnaces, of which three only are at present in blast, producing about 2,000 tons of pig-iron weekly. They possess also Bessemer steel works, producing 1,800 tons of steel ingots each week, which they convert into about 1,600 tons of finished material, such as rails, tin-plate bars, tyres, &c. ; a foundry, and brick yards. As regards collieries, the Company possess six within this district, of which three are "levels," and three are pits varying in depth from 100 to 300 yards. All the six collieries are working steam, house, and gas coal. Coal-mining operations have been carried on for at least a century in this locality, and the coal has consequently been largely worked, though there appears to be still a considerable quantity remaining, which, at the present rate of working, will not, it is considered, be exhausted for some 25 years.

Sewerage and House Drainage.—No complete system of sewerage has been carried out in this district ; such sewers as exist having been provided from time to time as occasion required. The main sewers consist of culverted water-courses, and brick-barrel sewers. The smaller sewers and house drains are said to consist of glazed stoneware pipes, though some box drains apparently still exist. The old main sewers have in some cases been built over. Thus the main sewer, or, more correctly, covered brook, which runs from King-street, at the north-east of the town, to the bottom of Prince's-street, passes under a number of houses. In the case of one hotel a trap-door was found in the crown of an old main sewer as it passes under the small backyard close to a window of the dwelling, and the yard privy discharges direct into this sewer. The trap-door is used as a means for the disposal of ashes and, doubtless, other refuse. The sewers, as a rule, are defectively ventilated. The culverted water-courses are, of course, naturally flushed, and certain sewers which drain property belonging to the Blaenavon Company are said to be flushed from time to time by the Company's servants with water from "feeders" to the works, or by means of tanks provided for the purpose ; but in other cases no provision has been made for the flushing of sewers. House drainage is in many cases of a very defective character. Some yard sinks are trapped with stoneware gulleys, but many are trapped with iron lip-traps. At New William-street sinks within wash-

houses were found trapped only with iron lip-traps, otherwise they were directly connected with the drain. Some houses at Forge-Side were met with which were unprovided with slop drainage of any kind, slops being thrown on to the ill-kept road, down which they made for themselves irregular channels.

Sewage Disposal.—The sewage from a part of “Forge-Side” is conveyed into a ditch leading to the Afon Llwyd, but an arrangement is made by which it may be distributed over some grass land. At the time of my visit, a quantity of this sewage was going direct to the river, some of it only was being first passed over the land. For the rest, practically the whole of the sewage of this district is conveyed to the river without any previous treatment, and may be seen discharging into the stream by various outfalls.

Excrement and Refuse Disposal.—Excrement disposal is mainly on the water-carriage system, though a few privies still exist. The water-closets, which consist of hopper pans, mostly of the long hopper type, are, however, usually dependent upon hand-flushing. In certain parts of the district, as at Garn-yr-erw and Forge-Side, some of the closets are fitted with untrapped iron pans directly connected with the drains. Not only do these closets act as drain ventilators, but the pans were in many cases found in a filthy condition. Some of the privies are directly connected with or drained into sewers, while a few others discharge into the river. Ashes and house refuse, which are collected by occupiers in buckets and other moveable receptacles, are removed daily by the District Council’s staff in Blaenavon, and twice a week by the Council’s contractors at Garn-yr-erw and Forge-Side. At Forge-Side, however, ashes and house refuse were found lying about in heaps at the time of my visit; elsewhere, evidence was found of ashes and refuse being thrown into the river.

Water Supply.—The district is nominally supplied by the Blaenavon Gas and Water Company, Limited, with water obtained from mountain springs, which is collected into three reservoirs, having, it is said, an aggregate capacity of some 5,000,000 gallons. The service is supposed to be constant, but, as I was informed, the supply is deficient and irregular, being often during the summer only turned on about two hours in the day. Moreover, although the powers of the Company extend to the whole district, there are a considerable number of houses above the level of supply. The District Council have, therefore, recently obtained a loan of 3,750*l.*, with a view to supplying some of the houses in question, as at Forge-Side, which the Company apparently were unable to supply, and negotiations are going on between the Company and the District Council, with a view to the purchase of the waterworks by the latter.

River Pollution.—From what has been said it will be obvious that the Afon Llwyd is very seriously polluted by sewage, including excrement, in its course through the Blaenavon Urban District. It is also polluted by coal-washing at the Company’s washery, where some 4,000 tons of coal are washed for coke-making each week. The pollution which would otherwise occur from this course appears in this instance, however, to be very largely reduced by the arrangements which have been made for the recovery of the fine coal from the waste water of the washery. This water is first passed through settling tanks, and then pumped up again and re-used in the washery. Finally it is conveyed to a series of tanks or “ponds,” in which it is allowed to settle for 12 hours before being run off into the river. By these means it is stated that 50 tons a week of usable coal, which would otherwise pass into the river, are recovered for conversion into coke. At the time of my visit the effluent, though discoloured, was fairly clear, and evidently of a far less polluting character than that met with at many of the other washeries visited. In some places, as behind the Miner’s Arms, ashes are freely thrown into the river, which at the time of my visit was considerably choked up with rubbish of one and another sort.

Points in regard to the future Disposal of Sewage.—There are some six meadows abutting on the river a little below Blaenavon which appear to be suitable as regards level for the disposal of the sewage of this district.

There has been no subsidence in the neighbourhood of the river such as would interfere with a main sewer. The river is uncovered the greater part of its course, though covered in for one or two short distances in the neighbourhood of the works.

ABERSYCHAN URBAN DISTRICT.

This District was formed, May 1864.

Area, in acres, 10,129.

Population, 1881, 13,496 ; 1891, 15,296.

Inhabited houses, 1881, 2,636 ; 1891, 2,990.

Annual assessable value, 40,590*l.* in September 1895.

General district rate (1893–94) in Abersychan and Pontnewynydd, 1*s.* 11*d.* in £.;
in rest of district, 1*s.* 5*d.* in £.

Outstanding loans under Public Health Acts, 2,413*l.* at Lady Day 1894.

Outstanding loans under other Acts, nil.

Registration district, Pontypool.

Registration sub-district, Pontypool.

Amount spent in sewerage works during last 10 years (all out of current rates),
808*l.* 11*s.* 6*d.*

This large Urban District lies between the Blaenavon Urban District on the north and the Abcrearn and Panteg Urban Districts on the south. On the west it is bounded by the Abertillery District, and on the east by the Pontypool Urban and Rural Districts. It has an average length of about five miles, an average breadth of about $3\frac{1}{2}$ miles, and it occupies both banks of the River Afon Llwyd for a distance of some $3\frac{1}{2}$ miles. It also occupies the west bank of that river for a short distance in the north, and the east bank for a short distance in the south. Like the Blaenavon Urban District, it is on the eastern limit of the South Wales Coal Measures, which crop out in the extensive range of hills on the western side of the district. Topographically the district consists for the most part of a deep and somewhat narrow valley cut by the Afon Llwyd River through the Millstone Grit and Carboniferous Limestone which crop out beyond the Coal Measures. The western side of the district, however, is further cut through by tributaries in the Cwm Ffrwd, Cwm Nantddu, and Cwm Ffrwdoer Valleys; the tributaries from the two last-named valleys uniting to form the Nantddu, which enters the Afon Llwyd just below Pontnewynydd. In addition to these tributaries, there are also in the district the Sychnant Brook and the Trosnant Brook, the former of which joins the Afon Llwyd at Abersychan, while the latter, which forms the southern boundary of the district, joins the river at the southern extremity of the Pontypool Urban District.

The chief centres of population in the district are: Varteg (some 200 houses), and Garndiffaeth with Victoria (some 860 houses), situate in the Cwm Ffrwd Valley on the north-west portion of the district. Elsewhere, Abersychan, including British and Talywain (some 1,000 houses), Snatch Wood (some 100 houses), Pontnewynydd Freehold (about 500 houses), and Tranch (some 160 houses). In the Cwm Nantddu and Cwm Ffrwdoer Valleys it is estimated that there are some 300 more or less scattered houses. With the exception of "Freehold," all these centres of population are situate on the western side of the Afon Llwyd. Coal-mining constitutes the chief industry in the district, there being at present five important collieries working steam coal, one of which has only recently been opened for working coal of this class.

There are also within the district the Pontnewynydd Iron Works and the Osborne Forge Tin-Plate Works. Both these were closed at the time of my visit, but only temporarily as I understood.

Whatever may be the prospects of the steel and tin-plate trades, a large amount of coal working is likely to be carried on in this district for a considerable number of years to come. In the Cwm Ffrwd and Cwm Nantddu Valleys there are said to be some 2,000 acres beneath which the steam coal is practically untouched. And throughout the western side of the district from this point northwards to Varteg Hill, I was informed by an expert that there is sufficient steam coal to last another 60 years at the present rate of working.

Sewerage, Drainage, and Sewage Disposal.—With the exception of Tranch and British, all the main centres of population are said to have been provided by the Local Authority with glazed stoneware socketed pipe sewers during the last 30 years or so, at a cost of some 4,500*l.*, which has all been defrayed out of current rates. Practically all the sewers are stated by the Surveyor to have good falls. Except at Abersychan, however, where the surface water sewer gratings at the road side are untrapped, no special provision has been made for the ventilation of sewers. Except at Varteg, no special arrangements have been made for sewer-flushing.

All the sewers discharge their sewage "untreated" directly into the Afon Llwyd or into one of its tributaries.

The house drains, which are mostly constructed of stoneware pipes, appear as a rule to be trapped with stoneware gulleys.

Excrement and Refuse Disposal.—For excrement disposal, hand-flushed pan closets with traps are in common use. Scattered houses (of which in some localities there are a considerable number, as at Victoria) situate beyond the lines of the sewers, are, however, provided with old cesspit privies, in some cases with pails. Such houses mostly have some garden ground, and the emptying of the privy is left to the occupier. At Varteg, some untrapped hopper closets built in cement and discharging into a 12 inch pipe, carrying a stream of water, were met with. Just above the bridge at Abersychan some cottages were also seen to be provided with privies built over a drain discharging into the river.

Ashes and house refuse are scavenged by the District Council's contractor; weekly in the northern part of the district, thrice weekly in the southern ward and at Abersychan.

Water Supply.—With the exception of British the whole of the district is, for water purposes, within the sphere of the Pontypool Gas and Water Company, which also supplies the Pontypool and Panteg Urban Districts. Until recently, the supply to the Abersychan District is said to have been very deficient. Water is, however, now collected by the Company in a new reservoir, having a capacity, it is said, of 7,000,000 gallons. From this reservoir water is pumped into a high service reservoir (half-million gallons) at Varteg, and distributed by gravitation in iron mains to the Abersychan Urban District. The supply is believed by the Medical Officer of Health to be good in quality and now abundant in quantity for ordinary domestic purposes.

Trade Pollution of River.—As already said, the only tin-plate works in this district are at present closed. Plates, however, were never tinned at the works in question, but were sent to Pontypool to undergo this process. At Varteg, where coal washing is carried out, settling tanks have been provided. The main pollution therefore of the Afon Llwyd in this district is by sewage.

Facilities for Sewage Disposal.—There appears to be but little suitable land within this district for sewage disposal. There is an area of some $2\frac{1}{2}$ acres in the northern part of the district which would take the sewage of Varteg and so avoid the need for a sewer from Varteg to Twynyffrwd. Below this, however, it would appear that a sewer should be constructed throughout the district, as the population is almost continuous to Pontypool. There is also a little land below Abersychan which might be made to serve for disposal of Abersychan sewage, though it is questionable whether the amount of land available here would suffice. In the lower part of the district, just above Pontypool, there is a field of nearly five acres which would be suitable, the Surveyor considers, as regards level and character of soil, and which is situated on the eastern side of the river. This quantity of land, however, appears insufficient for the needs of the whole district, and objection was raised by the inhabitants of Pontypool to the use of it for sewage purposes, as was once contemplated by the Abersychan Urban District Council, on account of its proximity to the town of Pontypool. As a consequence, the Abersychan Urban District Council have in contemplation a scheme for disposing of their sewage on one of two alternative sites, respectively situate in the north of the Panteg Urban District and just below Pontypool-road station. This land they consider would serve for the disposal of all the sewage of the Abersychan, Pontypool, and Panteg Urban Districts, and they wish to promote a joint scheme for the purpose.

The Abersychan Urban District Council are, I was assured, quite prepared to take action with a view to preventing the pollution of the river by their sewage if other Councils would adopt similar measures. But they are very averse to a main tank sewer.

River uncovered in this district. . . No engineering difficulties. . . No subsidence. . .

PONTYPOOL URBAN DISTRICT.

Date of formation, May 1863.

Area, 229 acres.

Population, 1881—5,244 ; 1891—5,842.

Inhabited houses, 1881—1,009 ; 1891—1,122.

Annual assessable value, 18,239*l.* General district rate, 2*s.* 6*d.* in £. (1893-94).

Balance of outstanding loans under Sanitary Acts } 24,188*l.* at Lady Day 1894.
Balance of outstanding loans under other Acts }

Registration district, Pontypool.

Registration sub-district, Pontypool.

Amount expended upon sewerage works during the last 10 years, 412*l.* 2*s.* 6*d.* (all paid out of current rates).

This small Urban District, which is embraced on the north and west by the Abersychan Urban District, and bounded on the south by the Panteg Urban District, consists mainly of the town of Pontypool. It occupies both banks of the River Afon Llwyd for a distance of a little under a mile. The inhabitants are engaged in the ordinary business of a market town, in coal mining, and in tin-plate works. There are no collieries actually in the district, but a number of the inhabitants are employed at coal working in the neighbouring district of Abersychan. Others are employed at the town "Forge" Tin-Plate Works; but these works, although at present in operation, are said to have worked irregularly of late owing to the general depression in the tin-plate trade.

Sewerage and House Drainage.—No complete system of sewerage has been carried out, but most of the district has been sewered in a piecemeal fashion from time to time. The older sewers consist of circular stone and brick culverts from two feet to three feet in diameter, put down many years ago. More recently laid sewers are constructed of glazed stoneware socketed pipes having clay joints. The sewers, as a rule, have steep gradients. Their ventilation is defective, the only provision so far made in this respect consisting of some four-inch iron upcast shafts erected against dwellings. No special arrangements exist for flushing the sewers.

In the case of newer houses, house drains consist of glazed stoneware pipes, but for old houses box drains still exist in some cases, though pipe-drains are gradually being substituted for them as opportunity offers. Yard sinks are sometimes trapped with stoneware gulleys, but often with iron lip-traps. In some cases iron lip-traps were found under the water taps within dwellings, by way of trapping drains directly connected with the sewer.

Sewage Disposal.—No arrangements have been made for the systematic treatment of sewage, and, as a consequence, practically all the sewage of the district, except a little from North-road which is discharged on to fields, is turned "untreated" either directly into the Afon Llwyd or into the Trosnant Brook, a tributary of that river, by a number of different outfall sewers and drains.

Excrement and Refuse Disposal.—Excrement disposal is mostly accomplished by hand-flushed pan and siphon closets, usually of the long hopper type; but some old cesspit privies still exist. One or two iron ash pits have been provided by the Urban District Council for the storage of ashes and house refuse, but these are usually collected by householders in buckets and boxes, and removed daily by the District Council's contractors. Householders, however, frequently deposit their ashes and refuse in the back roads, where such refuse may be found lying about, though not in large quantities, owing to its frequent removal. Owing to the smallness of the district there is great difficulty in finding "tipping" grounds. At present the Council rely upon one which they rent in the Abersychan Urban District.

Water Supply.—The district is supplied by the Pontypool Gas and Water Company. Until about two years ago the supply was obtained entirely from springs near Varteg in the Abersychan Urban District, and the supply appears to have been unsatisfactory as regards quantity. Since that time, however, the Company have obtained powers to supply the Panteg Urban District, and have considerably augmented their supply. The water is considered to be of good quality, and it is believed that the springs yield an ample supply, though some inconvenience appears to have occurred from frequent intermissions of the service for repairs. Otherwise the supply is constant, and is laid on to almost all the houses in the district.

Pollution of the River.—Both the river and its tributary, the Trosnant Brook, are seriously polluted by the sewage of the town of Pontypool, which includes most of the excrement and also the drainage from slaughter-houses, &c. At the lower part of the district the whole of the water of the river is at times diverted by a feeder to the Pontymoile Iron Works. This had happened at the time of my visit, and as a consequence, a large quantity of Pontypool sewage was stagnating in a huge pool in the river bed, below the intake of the feeder in question.

One slaughter-house, which is situate on the bank of the river, drains directly into it, and at the time of my visit, when slaughtering was going on, blood was being freely discharged into the river. At the town "Forge" Tin-Plate Works no copperas tanks have been provided, but apparently no acid finds its way into the river, except such as is contained in the swilling tubs, for the spent pickle from the pickling tubs is collected in tanks, and is said to be always sent away either for crystallisation at other works belonging to the same Company, or for sale.

Points in regard to the future disposal of Sewage.—There does not appear to be any suitable land within this district for the disposal of sewage, apart, at all events, from expensive pumping operations. The question of a joint scheme for the Abersychan, Pontypool, and Panteg Urban Districts has, on several occasions, been considered by the Pontypool Urban District Council, but the matter appears at present to be at a standstill so far as this district is concerned. There has been no subsidence from coal mining along the line of the river in this district. The river is uncovered in its whole course.

PANTEG URBAN DISTRICT.

Date of formation, May 1864.

Area, 5,577 acres.

Population, 1881—5,539; 1891—6,479.

Inhabited houses, 1881—1,082; 1891—1,256.

Annual assessable value, 16,293*l*.

General district rate ranges in different wards of the district from 10*d*. to 1*s*. 8*d*. in the £. (1893–94).

Balance of outstanding loans under Sanitary Acts } 1,452*l*. at Lady Day 1894.
Balance of outstanding loans under other Acts }

Registration district, Pontypool.

Registration sub-districts, Pontypool, Llangibby.

Amount expended upon sewerage works during the past 10 years, 496*l*.

This Urban District lies in the Afon Llwyd Valley, between the Abersychan and Pontypool Urban and the Pontypool Rural Districts on the north and the Llanfrechfa Upper Urban District on the south. On the east it is bounded by the Pontypool Rural District, and on the west by the Abercarn Urban District. For some two miles in the north it occupies the western bank only of the Afon Llwyd, which here separates it from the Pontypool Rural District; south of this it occupies both banks of the Afon Llwyd for a further distance of two miles. While the western side of the district includes a large area of a range of sandstone hills of the Coal Measures (Mynydd Maen) which rise to an elevation of over 1,500 feet above Ordnance Datum, the greater part of it lies at a comparatively low level, much of it occupying an alluvial tract of country, which in this part of the Afon Llwyd Valley attains a considerable width. The chief centres of population are Cwm Ynys-Cow, an old straggling village of some 300 houses erected along the line of the Cwm Brook, a tributary of the Afon Llwyd; Pontymoile, a cluster of some 100 old houses on the west bank of the Afon

Llwyd, immediately below Pontypool; Griffiths Town, a large and comparatively new town of some 420 houses; Sebastopol, also a comparatively new village of about 200 houses, both on the west side of the river; and New Inn, a small village on the east side of the river, of about 80 dwellings, mostly new. As regards the occupations of the people, a considerable number are employed in the engine sheds of the Great Western Railway, while the remainder are mostly engaged in coal-mining, tin-plate working, steel working, and brick making. There are two collieries in the district, namely, the Glyn and Blaendare Collieries, both of which work house and steam coal, though the former was idle at the time of my visit. There are also within the district the Panteg Steel Works and Tin-Plate Works, Messrs. Baldwin & Co.'s Galvanising and Tin-Plate Works, near Pontymoile, the Pontypool Tin-Plate Works at Pontymoile, and the Pontrhydyrun Tin-Plate Works at Pontrhydyrun. Of these works, however, the Panteg Tin-Plate Works, and the Tin Plate-Works at Pontymoile, were closed at the time of my visit, though I was given to understand that the latter would in all probability shortly be re-opened. The Pontrhydyrun Tin-Plate Works, which had been closed for two years, had again commenced work shortly before my visit.

With regard to trade prospects, the greater part of the district lies outside the Coal Measures, and is regarded as likely to remain agricultural. There is, however, a fair quantity of coal to be worked on the western side of the district, and although the Glyn Colliery is temporarily closed owing, it would appear, to the chief seams having been worked out in the neighbourhood of the pit, it is proposed, I was informed, to sink another pit in a fresh situation. There is some indication of a revival in the tin-plate trade.

Sewerage and Drainage.—All the populous areas have been sewered with glazed stoneware socketed pipes at different times during the past 30 years. Speaking generally, the sewers appear to be insufficiently ventilated, such ventilation as there is consisting, in most instances, of a few 4-inch or 6-inch up-cast shafts erected against houses. At New Inn there is no provision for ventilation of the sewers except by means of a few rainwater down-spouts which are directly connected with the drains. More care has been displayed in regard to the flushing of sewers. Thus the Cwm Ynys-Cow sewer is flushed by means of a tank which has been erected at its head and is supplied by the Cwm Brook. Three flushing tanks, supplied by the public mains, have been provided in connexion with the Griffiths Town sewers, and two, supplied from the canal, in connexion with Sebastopol sewers. All these tanks are said to be discharged twice a week.

House drains appear to consist mostly of glazed socketed pipes, and the yard sinks are commonly trapped with stoneware gulleys, though in not a few instances iron lip-traps were met with. At Cwm Ynys-Cow some of the house drainage is of a very defective character. In other localities, as already mentioned, some of the rainwater down-spouts are directly connected with the drains, so as to serve as sewer ventilators, which is an objectionable practice. On the whole, however, house drainage in this district appeared to me to compare favourably with that of the majority of the other districts visited.

Sewage Disposal.—The sewage from the village of Cwm Ynys-Cow and from Pontymoile is discharged by a single outfall direct into the Afon Llwyd River, just below Pontymoile Bridge. The Local Authority, however, deserve credit for having at least made an attempt to deal with the sewage of most of the populous places in their district otherwise than by turning it direct into the river. Thus, the sewage of Griffiths Town is, by arrangement with a farmer, distributed over a farm lying near the river, of which, it is said, at least 80 acres are available for sewage treatment. By other arrangements the sewage of Sebastopol and New Inn is, in each case, also passed over land before finding its way to the Afon Llwyd. That the treatment of sewage on these farms, which, for the most part, was initiated some years ago, is by no means altogether satisfactory, is, I was given to understand, fully recognised by the Urban District Council, who are contemplating the adoption of some additional or alternative method of sewage treatment. At the time of my visit, for instance, the ditch draining the fields on which the New Inn sewage is distributed, and which ultimately joins the Afon Llwyd, showed very obvious signs of pollution by sewage; on the Sebastopol sewage fields a large quantity of black, decomposing, and offensive sewage was found in a so-called tank cut in the soil, in proximity to a foot-path and to dwellings; and similar nuisances were found near the railway on the Griffiths Town sewage farm. It should be stated, however, that at the time of my visit I did not discover any sewage from either of the two latter farms gaining access to the river.

Excrement and Refuse Disposal.—Excrement disposal is almost entirely carried out by means of hand-flushed pan and trap closets. A few privies still exist, however, some of which, as at Cwm Ynys-Cow, are directly connected with the sewers. Ashes and house refuse are stated to be removed from the several centres of population thrice weekly by the District Council's contractors. At Cwm Ynys-Cow these matters are stored, pending removal, in large uncovered stone ash-pits, erected for the purpose at the road-side. Elsewhere they are stored in buckets, boxes, or other receptacles.

Water Supply.—Cwm Ynys-Cow is supplied with water from the adjacent hills. These springs are piped from their source to a tank, from which the water is distributed by gravitation in cast-iron pipes to spouts at the roadside. The supply is said to be

abundant in quantity and good in quality. Sebastopol, Griffiths Town, and New Inn are supplied by the Pontypool Gas and Water Company from their new hill spring, known as the "Folly" spring, and this supply is also said to be ample and good.

River Pollution.—The river is, of course, systematically polluted by the crude sewage from Cwm Ynys-Cow and Pontymoile; and at the time of my visit some pollution of the river was, as already said, going on as a result of the defective arrangements for treatment of the sewage of New Inn village. In regard to trade pollution, the waste pickle from the Pontrhydyrun Tin-Plate Works was being turned "untreated" into the river. Copperas tanks had, however, just been provided, and were, I was informed, about to be brought into use. At both the Pontymoile and Panteg Tin-Plate Works, which were, however, closed at the time of my visit, arrangements had been made for recovery of the sulphate of iron from the waste pickle. At the galvanising works, where hydrochloric acid is used for pickling the plates, the waste pickle was being passed over limestone before being allowed to find its way into the river. The tank, however, was a somewhat diminutive one, and, owing to its special arrangement, only a small proportion of the waste liquor was coming into contact with limestone.

Points in regard to the future Disposal of Sewage.—There appears to be ample available land within the district of a suitable character for the disposal of sewage and, as already mentioned, page 41, the question has been raised of a joint scheme for the disposal of the sewage of the Abersychan, Pontypool, and Panteg Urban Districts upon some land in this district a little to the south of Pontypool-road Station. There has been no subsidence from undermining in the neighbourhood of the river in this district, and none is likely to occur, as the river lies to the east of the Coal Measures; nor would there apparently be any engineering difficulties in regard to the construction of a main trunk sewer for the Afon Llwyd Valley.

LLANFRECHFA UPPER URBAN DISTRICT.

Date of Formation, November 1870.

Area, 1,786 acres.

Population, 1881 census, 2,332; 1891 census, 2,780.

Inhabited houses, 1881 census, 407; 1891 census, 537.

Annual assessable value, 6,518*l.*; General District Rate, 2*s.* 3*d.* in the *£.* in 1893–94.

Balance of outstanding loans under the Public Health Acts } 13,723*l.* at Lady-day 1894.

Balance of outstanding loans under other Acts (for water) }

Registration district, Pontypool.

Registration sub-district, Llangibby.

Amount expended upon sewerage works during the last 10 years, 166*l.* 2*s.*, which was paid out of current rates.

This Urban District is situate in the lower part of the Afon Llwyd Valley, where it lies between the Panteg Urban District on the north, and the Llantarnam Urban District on the south. On the east it is bounded by the Panteg Urban and the Pontypool Rural Districts, from the latter of which it is separated by the Afon Llwyd River. On the west it abuts on the Abercarn Urban District. Occupying the western side of the valley, which is here widening out, the district extends up the slope of the Mynydd Maen, practically to its summit, the elevation increasing more or less gradually from about 260 O.D. on the east to over 1,500 O.D. on the extreme west of the district. Geologically the western side of the district is on the eastern outcrop of the Coal Measures, and the underlying Millstone Grit and Carboniferous Limestone, the remainder of the district being situate upon the Old Red Sandstone.

The chief centres of population are:—

	Approximate Population..
Pontnewydd (including Mount Pleasant)	1,250
Upper Cwmbran	750
Pontrhydyrun (including Lowlands)	300
Spring Vale and New Houses	250

The principal industries of the population are coal-mining, tin-plating, and iron-working, there being within the district two collieries and two tin-plate works, as follow:—

Collieries.—1. The Cwmbran colliery, a "level" working steam-coal at the outcrop, and employing some 700 persons, who do not, however, all reside within the district.

2. A small "level" at Upper Cwmbran working a little steam and house coal.

Tin-Plate Works.—1. The Eastern Valleys Company's works, known as the Tynewydd Works.

2. The Avondale Company's works, situate at Pontnewydd.

There is also a small brickworks at Upper Cwmbran. The ironworkers are employed in other districts.

Sewerage and House Drainage.—Pontnewydd, which is the chief centre of population in the district, was sewered by the late Local Board shortly after its formation. The sewers which converge to one outfall consist of circular brick drains and glazed socketed stoneware pipes having clay joints. These sewers are believed to have good gradients, but the gradients are not definitely known. There is no provision for flushing them beyond the surface water from the streets which is admitted to them by trapped street gulleys. The only provision for ventilation of the sewers consists of some few 4-inch shafts carried up the sides of dwellings. Mount Pleasant was sewered by the Urban District Council during 1894 with glazed stoneware socketed pipes having clay joints. These sewers are also devoid of adequate means of flushing and ventilation.

Pontrhydyrun, Spring Vale, and New Houses are drained by pipe sewers put down some years ago and unprovided with any special arrangements for flushing or ventilation. Upper Cwmbran is altogether unprovided with sewers. Much of the house drainage in this district is of a very defective character, consisting in some cases of irregular open brick channels or of box drains, and in others of defectively trapped or untrapped pipes. Some dwellings are unprovided with drainage of any sort, as, for instance, at Upper Cwmbran, where the slops are thrown direct into the Upper Cwmbran Brook, a tributary of the Afon Llwyd. At "New Houses" sinks, trapped only with small lip-traps and directly connected with the drains, have been provided in the pantries of most of the dwellings. In a number of instances the sink-wastes had at the time of my visit been filled with concrete, apparently by the tenants, on account of the foul smells emitted from them. In other instances, however, no such precaution had been taken, and complaints were made to me by the tenants with respect to offensive smells thus introduced into their pantries.

Sewage Disposal.—This is one of the few districts met with in my inquiry, in which some provision has been made for the purification of sewage. Thus, most of the sewage of Pontnewydd and Mount Pleasant is conveyed to a single outfall on a farm (Llantarnam Grange Farm) about a quarter of a mile to the south of Pontnewydd village, and just within the Llantarnam Urban District, where it is distributed in a somewhat primitive fashion over grass land, of which it is said some 150 acres are available for the purpose. The arrangements admit, however, of the sewage being on occasion diverted into a ditch, instead of being conducted over the land, and in such an event it might apparently, after passing for a considerable distance along field ditches, find its way to the Afon Llwyd River. At the time of my visit the sewage appeared to be all being dealt with upon the land. As regards the permanency of this arrangement, the owner of the land has agreed by letter to take the sewage for an indefinite period, and to give the Urban District Council one year's notice of his intention to discontinue so doing. A small quantity of the sewage of Pontnewydd (*viz.*, that from Cromwell-place) is conveyed to a cesspool on another farm, the owner having agreed to this arrangement for a nominal annual fee, subject to three months' notice on his part. By a similar arrangement the sewage from Tynewydd is taken to a large cesspool built in brickwork on a third farm, the overflow being distributed over a 7-acre field. In this instance no provision at all seems to have been made with regard to terminating the arrangement. The sewage from Spring Vale and New Houses is conveyed to large brick cesspools on land belonging to the owners of the respective properties. In the latter case the overflow is distributed over grass land, but in the former it passes into a roadside ditch, where it gives rise to nuisance. Moreover, the Spring Vale cesspool, which is of considerable size (about 12 feet by 9 feet), and is only partially covered, is situate but a few yards from the road, and only some 60 yards from the Spring Vale houses. The Pontrhydyrun sewage is discharged into a ditch, which eventually leads to the river, though it is doubtful whether any sewage actually gets to the river, except, perhaps, in time of flood. At the south-end of this village, however, some dozen houses drain their slop-sewage into a brook going to the river.

At Upper Cwmbran nearly all the slop-sewage is discharged "untreated" into the Upper Cwmbran Brook, and thus finds its way to the Afon Llwyd River.

Excrement and Refuse Disposal.—Excrement disposal is for the most part by hand-flushed pan and siphon closets; but not a few privies still exist. At New Houses pail-closets have been provided. The privies generally are of a very objectionable kind. At Upper Cwmbran, for instance, some of them consist of untrapped hoppers built of concrete, and communicating directly with unventilated cesspools. Others discharge into the watercourses leading to the Upper Cwmbran Brook, while some discharge into filthy bogholes in the field behind them.

The Urban District Council have recently arranged with a farmer to remove the ashes and house refuse from premises at Pontnewydd twice in each week. Elsewhere the disposal of such refuse, as well as the cleansing of privy receptacles, is left to the owners or occupiers of property, with the result that at Mount Pleasant, for instance, ashes and house refuse were found lying about in heaps in the neighbourhood of dwellings.

Water Supply.—A water supply was provided by the late Local Board under a local Act. The water is obtained from springs in the Cwmbran Mountain, whence it is conveyed in glazed stoneware pipes to a small reservoir, from which it is supplied in iron mains by gravitation to all the centres of population in the district. The supply is constant, and is in most cases laid on to the individual houses. It is believed to be ample in quantity, and of good quality.

Pollution of the River Afon Ilwyd.—Although, as will have been seen, a certain amount of sewage, mainly from Upper Cwmbran, finds its way indirectly into this river, it would, nevertheless, appear that pollution of the river by sewage from this district has been reduced to comparatively small proportions by the arrangements made for its disposal. These arrangements are, of course, open to considerable criticism, and it is possible that they might be terminated by the owners of the land used for sewage disposal at comparatively short notice. Nevertheless, credit must be given to the late Local Board for having at least endeavoured to observe the law in this respect. As regards trade pollution, no attempt had been made at the time of my visit to recover the waste acid from the Avondale Tin-Plate Works; the wash-pickle was being all discharged into the Upper Cwmbran Brook, and so into the river. Copperas plant was, however, as I was informed, about to be provided. At the Tynewydd Tin-Plate Works, on the other hand, copperas tanks had been provided, and the waste acid from the pickle-tubs was being thus recovered. The wash from the swilling-tank, however, was discharged into the Upper Cwmbran Brook.

A considerable amount of coal-washing is carried on at the Cwmbrian Colliery by means of a Sheppard's washery. The water used in washing the coal is not used again and again as is frequently done elsewhere, but is passed through settling tanks and afterwards into a watercourse going to the Afon Llwyd River. The so-called tanks, of which there are four in number, having average measurements of about 6 yards by $2\frac{1}{2}$ yards by 4 feet deep, are of a primitive type, consisting merely of excavations in the ground. At the time of my visit the tank in use was almost full of deposit, and the waste water was running over the surface of this. The appearance of the effluent on entering the brook closely resembled that of ink.

Facilities for Disposal of Sewage.—There would appear to be ample available land in this district for the disposal of sewage. No subsidence has occurred or seems likely to occur in the neighbourhood of the river as a result of mining operations, the river being altogether outside the eastern limit of the South Wales Coalfield; nor do there appear to be any physical circumstances in this district which need occasion any special engineering difficulties in carrying a main trunk sewer down the Afon Llwyd Valley.

LLANTARNAM URBAN DISTRICT.

Date of formation, September 1885.

Area, 4,097.

Population, Census 1881, 3991; 1891, 4905.

Inhabited houses, Census 1881, 683 ; Census 1891, 887.

Annual assessable value, 11,008*l.* General district rate, 1*s.* 1*d.* in the £. in 1893-94.

Balance of outstanding loans under the Public Health Acts	} 2,684 <i>l.</i> at Lady-day 1894.
Balance of outstanding loans under other Acts - -	

Registration district, Newport.

Registration sub-district, St. Woollos.

Amount expended upon sewerage works during the last ten years, (?) .

This Urban District is situate in the Afon Llwyd Valley, between the Llanfrechfa Upper Urban District on the north, and the St. Mellons and Magor Rural Districts on the south. On the east it is separated by the River Afon Llwyd from the Pontypool Rural District, and upon the west it abuts upon the Abercarn Urban District. It occupies the western bank of the Afon Llwyd for a distance of some three and a-half miles, being limited to this bank of the river, except for about a quarter of a-mile in the north-east of the district, where it also occupies the east bank.

The chief centres of population are as follow :—

chief centres of population are as follow :—	Approximate population.
1. Cwmbran - - - - -	1,250
2. Oakfields, with two locks and Fairview - - - - -	950
3. Forge Hammer Division - - - - -	625
4. Glencoed Division - - - - -	450
5. Grange Road - - - - -	380
6. Llantarnam Village - - - - -	230
7. Ty Coch and Baltic - - - - -	200
8. New Town and Henllys - - - - -	180

The principal occupations of the people are iron working, tin-plate working, coal-mining, and brick-working. There are, however, no tin-plate works or collieries actually within the district, the tin-plate workers and coal-miners being employed in neighbouring districts. Within the district the chief works are the ironworks of the Patent Nut and Bolt Company (blast furnaces and foundries); the Oakfield Iron and Wire Works; and several large brick and tile works. There are also some vitriol works.

Like the Llanfrechfa Upper Urban District, the Llantarnam Urban District extends up the slope of the the mountain ridge, which forms the western boundary of the valley. The greater portion of the district, however, is situate in the lower and relatively flat portion of the valley along the western side of the river, where much of the land is devoted to agriculture. Geologically almost the whole of the district lies upon the Old Red Sandstone, which, in the bottom of the valley, is covered with a considerable thickness of glacial gravels disintegrated towards the surface into a stoney clay.

The chief tributaries of the Afon Llwyd within this district are the Cwmbran and Llandowlais brooks. The district is also traversed by the Monmouthshire Canal.

Sewerage and House Drainage.—No comprehensive system of sewerage has been carried out in this district, though most of the chief centres of population have, at different times, been sewered to separate outfalls and in a piecemeal fashion, by glazed socketed pipes having clay joints. The sewers are unprovided with any arrangements for either ventilation or flushing, except the Grange Road sewer, which is said to be flushed by a stream diverted into it. It is, however, admitted that this arrangement fails in dry weather, when it is most needed, owing to deficiency of water in the stream in question. No attempt has been made to sewer the Glencoed division, and as a consequence sewage nuisances are common there.*

The house drainage, which consists mostly of glazed pipes, but in some instances of open brick channels and of box drains, is, speaking generally, of a very unsatisfactory character. Some yard sinks are trapped with stoneware gulleys, but very many are defectively trapped with iron lip-traps, which were frequently found to have been removed; many yard-sinks are not trapped at all. In certain localities, notably Oakfields, Ty Coch, and Newtown, the house drainage is of a particularly defective character, and urgently in need of attention. Not a few drains in these places were found either untrapped or stopped up, while in other instances slop sewage was stagnating in the open channels which do duty for house drains.

Sewage Disposal.—In this district some attempt has been made to diminish the pollution of the river by sewage. Thus Cwmbran sewage is conveyed by two outfall sewers to two separate brick catchpits, or subsidence tanks, on some fields abutting on the Cwmbran Brook, just to the east of Cwmbran. The effluent from these tanks is supposed to be distributed over these grassfields, by means of channels cut in the turf, before finding its way into the Cwmbran Brook. At the time of my visit, however, practically the whole of the sewage flowing from one of these tanks was, as it would seem intentionally, diverted into a ditch, and was passing thence into the brook. The sewage from the other tank was not being properly distributed, but was flowing on to a very limited area of land which appeared to be sewage logged. Moreover, one of these tanks, which is only loosely covered with sleepers, and about which complaint was made to me, is situate close to a footpath, said to be private, but much used by the public, and but 50 yards from a railway signal box.

The sewage of the locality known as Grange Road is also conveyed to some grass land, over which at the time of my visit it was being fairly well distributed.

From other parts of the district a considerable quantity of crude sewage is discharged direct into the Cwmbran and Llandowlais Brooks, and thus finds its way into the Afon Llwyd. This is the case with the sewage of the Forge Hammer division, which is discharged into the Cwmbran Brook close to the gas works; and with some of the slop sewage from the Glencoed division, which finds its way into that brook through a culvert into which it is drained.

In some localities, as for example parts of Glencoed, slop sewage is, owing to the absence of proper sewerage, led to cesspools, which overflow into fields, causing nuisance.

Excrement and Refuse Disposal.—At some of the chief centres of population, such as Cwmbran, Forge Hammer, and Grange Road, excrement is disposed of mainly by some form of closet connected with the sewers. In most cases these closets consist of hopper pans (sometimes long and sometimes short hoppers) fitted with siphon traps, but dependent on hand flushing. In some instances the pans are untrapped; in others the closets consist of untrapped cement hoppers directly connected with the drains. A number of particularly offensive closets of this kind were met with at Forge Hammer. Such closets are, of course, most objectionable, not only on account of the foul emanations given off from the filth-covered sides of the hoppers, but also from the fact of their acting as sewer ventilators.

In other parts of the district excrement is disposed of by pail closets, and more frequently by cesspit privies—the cesspit privies being of objectionable type. The cleansing of privies and pail closets is left to occupiers, and is unsatisfactorily carried out.

* I understand that since my visit to the Glencoed division a 9-inch pipe sewer has been put down for this locality by the Urban District Council.

At Cwmbran and Oakfields ashes and house refuse are removed at irregular intervals by the Urban District Council's contractor. Elsewhere in the district the removal of ashes and house refuse is left to owners and occupiers. As a consequence of this, and owing to the absence of ash-pits, ashes and refuse are found heaped up in yards and lying about in various directions.

Water Supply.—The Llanfrechfa Upper Urban District Council's Water supply is laid on to the chief centres of population, viz. : Cwmbran, Oakfields, Glencoed, Forge Hammer, Grange Road, Two Locks, Llantarnam, and Crocg-y-nwlch.

It is estimated that about three-quarters of the population use this water, the remainder depending upon shallow wells and springs, some of which are in dangerous proximity to possible sources of contamination.

Pollution of the River.—Both the Cwmbran and Llandowlais Brooks receive a considerable quantity of sewage from this district. As regards trade pollutions, the stream into which the water used for washing bottles at the Cwmbran Vitriol Works is discharged, was found, at the time of my visit, to be distinctly acid, notwithstanding that the water in question is passed through two small limestone filters.

Facilities for the Disposal of Sewage.—There is abundant land in this district which, as regards level, is considered by the Surveyor suitable for sewage disposal purposes, though much of it is of a clayey character. There is no prospect of subsidence of the ground in the neighbourhood of the river, and apparently no special engineering difficulties would be met with in carrying a main trunk sewer through this district, except in regard to the tunnels referred to in the schemes of the County Surveyor.

PONTYPOOL RURAL DISTRICT (PART OF)

The only portion of this District abutting upon the River Afon Llwyd is the parish of Llanfrechfa Lower. Within this parish, which in 1891 had a population of 1,128 persons, are situate four villages, namely: Pontrhydyrun, Garrw, Llanfrechfa Lower, and Ponthir, the inhabitants of which are mostly tin-plate-workers at the Pontrhydyrun Tin-Plate Works, in the Panteg Urban District, or at the Ponthir Tin-Plate Works at Ponthir in the Pontypool Rural District. At the time of my visit, however, both of these works were closed temporarily, and the people were dependent for employment on other districts. None of the villages in question have been sewered, and the houses are unprovided with drainage of any sort, in which case slop-waters are thrown on to the gardens, in some cases accumulating in pools, or are drained singly or in groups to adjacent fields, or into ditches and streamlets. Such drains as exist are defective open channels or old rubble drains; the latter for the most part untrapped, or imperfectly trapped. Excrement disposal is by privies of very objectionable type, some of which were found discharging into filthy open bog-holes. Owing to the absence of proper arrangements for drainage and for the disposal of excrement, filth nuisances were met with in different localities. Even where attempt has been made, as at Dover-place and Yew Tree Terrace, Garrw, to dispose of the sewage by distributing it over grass land in primitive channels cut for the purpose, the arrangement was found to be most unsatisfactory, owing to the proximity to the dwellings of the land selected for the purpose. At Yew Tree Terrace, moreover, nuisance from the cause referred to was enhanced by the fact of the privy cesspits overflowing on to the open field. The cleansing of privies and the disposal of ashes and house refuse is left to the owners or occupiers of premises. Some of the privies were in urgent need of cleansing at the time of my visit, and ashes and house refuse were found heaped about in the vicinity of dwellings. Most of the houses, however, have good-sized gardens. The villages in question depend for water-supply upon pump-wells and local springs, some of which at least would appear, judging from their position, to be in danger of contamination, especially in view of the defective arrangements for drainage. The village of Llanfrechfa Lower appears to be especially badly off as regards water supply; the spring upon which most of the inhabitants rely being said to usually fail in dry seasons. It would not appear that the river is subject to very serious pollution from sewage in this district, for not only is excrement disposal mainly accomplished by cess-pit privies, but a good deal of the slop sewage is disposed of upon gardens or drained on to fields, or into ditches at a considerable distance from the river. Nevertheless some pollution does take place at Pontrhydyrun, where the slops are thrown into the river at River Row, and the slop drains and privies of Pump Row discharge into a small stream leading to the river. Similarly some of the slop sewage at Ponthir apparently finds its way indirectly into the river by means of small water courses. At Garrw village also it is possible that some of the slop sewage which is drained to a stream, and the excrement from the four privies of some 16 houses, known as Lower Pontnewydd, which are built over the same stream, may also on occasion find its way to the river, though at the time of my visit this stream was being diverted for the purpose of irrigating some grass land.

MAGOR RURAL DISTRICT (PART OF).

This District occupies both sides of the Afon Llwyd River for a distance of one and a quarter miles, as it passes through the parish of Llangattock nigh Caerleon. The portion of this parish (population, in 1891, 246) in the neighbourhood of the river is very sparsely populated, including only a portion of the village of Ponthir, and a few scattered cottages. There are, however, within the parish, and situate on the bank of the river, the Caerleon Tin-Plate Works and a fellmongers' yard. The waste liquor from the lime tanks at the latter is admittedly turned into the river. The drainage from some pigsties on the premises also finds its way into the river. At the tin-plate works, however, plant for the utilisation of waste acid in the manufacture of copperas has been provided, and I did not find evidence of any notable pollution of the river from this source.

[CAERLEON URBAN DISTRICT.—The main population of this Urban District is concentrated in the town of Caerleon, which is drained to the Usk, and does not therefore come within the scope of this inspection. In following an extremely tortuous course, just before it enters the Usk, however, the tidal portion of the Afon Llwyd flows through the alluvial land forming the north-eastern part of the Caerleon Urban District, and in so doing it receives the sewage of some two or three water-closets, pigsties, and cowsheds, that are drained into sluices and a mill-race which discharge into the river.]

APPENDIX VII.

MONMOUTHSHIRE COUNTY COUNCIL.

COPY of REPORT of the County Surveyor on a Scheme for the Drainage of the Eastern and Western Valleys of the County.

To the Chairman and Members of the Parliamentary Committee.

Gentlemen,—

IN accordance with the request of the Chairman, I had the honour to submit a report on a scheme for the drainage of the eastern and western valleys of the county, with a plan showing the routes suggested. The proposed sewers are divided into sections, numbered one to seven.

Sewer No. 1.

Is a sewer commencing at a point above the railway station, Blaenavon, and as near as can be arranged on a level with the River Afon Llwydd, thence following the river through the Local Board Districts of Abersychan, Pontypool, Panteg, Llanfrechva and Llantarnam, and proceeding in a south-westerly direction, through the Local Board District of Llantarnam, by Cwmbran to the ford in the parish of Bettws (below Bettws Church), thence by a tunnel one and a-half miles or thereabouts in length, terminating at a point near the bed of the River Ebbw, by a junction with Sewer No. 6.

This sewer will convey the whole of the drainage of the eastern valleys, excepting Ponthir and Caerleon, which can by a separate sewer be drained into the tidal river above Caerleon.

Sewer No. 2.

Is a sewer commencing at a point near the railway station at Nantyglo, and as near as possible at a level of the River Ebbw Fach, thence following the said river through the Local Board Districts of Nantyglo, Blaina, and Abertillery to Aberberg, terminating at a point near the River Ebbw by a junction with the Sewer No. 3 from the Ebbw Vale valley.

Sewer No. 3.

Commences at a point near the railway station at Ebbw Vale, and near the level of the River Ebbw, thence following the said river through Ebbw Vale, Victoria, Cwm, and Llandaval, to Aberberg, terminating by a junction with Sewer No. 2.

Sewer No. 4.

Commences at Aberberg at the junction of Sewers Nos. 2 and 3, proceeding along the River Ebbw through the Local Board Districts of Abertillery, Newbridge, and part of Risca, terminating at a point near the confluence of the Rivers Ebbw and Sirhowy, and junction with Sewer No. 5.

Sewer No. 5.

Commences in the Local Board District of Tredegar, near Sirhowy Railway Station, at the level of the River Sirhowy, thence proceeding along the said river through Sirhowy, Tredegar, Bedwellty, Pontllanfraith, Ynysddu, Nine Mile Point, part of the parish of Machen, and part of the Local Board District of Risca, terminating at a junction with Sewer No. 4.

Sewer No. 5 drains the whole of the Sirhowy Valley.

Sewer No. 6.

Commences in the Local Board District of Risca at the junction with Sewers No. 4 and 5, thence proceeding along the River Ebbw through the said district, to a point southward of Tydu Station, terminating at a junction with Sewer No. 1 from the Eastern Valleys.

Sewer No. 7.

Commences at the junction of Sewers Nos. 1 and 6 in the parish of Rogerstone, thence proceeding in a southerly direction along the said River Ebbw, to a point north of the Brecon and Merthyr Railway, thence by a tunnel one mile or thereabouts in length under the said railway, skirting the fields west of the Deer Park, underneath the Newport

and Cardiff main road about 3½ miles from Newport, and thence in a south-westerly direction to low-water mark of the River Severn one mile from the sea wall, and one mile eastward of Peterstone Church.

Alternative Scheme for the Eastern Valleys.

This line of sewer is the same as described for No. 1 from Blaenavon to the boundaries of Llanfrechva and Llantarnam; from this point it follows the River Afon Llwyd through Ponthir, skirting the river to a point above the confluence with the River Usk, thence by an iron bridge (to be constructed) to the south-eastern side of the River Usk, thence through a tunnel two miles in length or thereabouts, passing through the parishes of Llangattock-nigh-Caerleon, Llanwern, Whitson, and Redwick, to low-water mark three-quarters of a mile westward of Redwick Church.

Length of Sewers.					
No. 1	-	-	-	-	15 miles. (Alternative scheme 21 miles.)
„ 2	-	-	-	-	5 „
„ 3	-	-	-	-	6 „
„ 4	-	-	-	-	7 „
„ 5	-	-	-	-	13 „
„ 6	-	-	-	-	3½ „
„ 7	-	-	-	-	6 „
					55½ miles.

The following is a Schedule showing the approximate Population of each District with the Rateable Value.

Name of District.		Population.		Rateable Value.		—
				£.	£.	
1	Tredegar Local Board	-	17,484	-	45,969	-
2	Ebbw Vale	-	17,025	-	41,038	-
3	Nantyglo and Blaina	-	12,360	-	46,466	-
4	Abertillery	-	9,138	}	37,224	-
5	Llanhilleth	-	2,000			
6	Bedwellty	-	2,700	-	13,000	-
7	Newbridge and Pontllanfraith	-	12,000	-	55,746	-
8	Risca	-	7,780	-	30,167	-
9	Rogerstone, including Bassaleg	-	2,802	83,289	14,852	284,462
10	Blaenavon	-	11,454	-	28,694	-
11	Abersychan	-	15,296	-	46,277	-
12	Pontypool	-	5,842	}	45,770	-
13	Panteg	-	5,763			
14	Llanfrechva	-	2,780	-	14,988	-
15	Llantarnam	-	4,905	46,040	14,561	150,290
				129,329	434,752	Total Eastern Valleys.

Estimated at 200,000*l.* at 3¼ per cent. interest. Principal and interest repaid in 30 years, about 5*l.* 5*s.* 4½*d.* per cent. in annual instalments. This on the rateable value is 6*d.* in the £.

Repaid in 40 years	-	-	-	-	-	5 <i>d.</i> in the £.
„ 50 „	-	-	-	-	-	4½ <i>d.</i> „
„ 60 „	-	-	-	-	-	4¼ <i>d.</i> „

I am, Gentlemen,
Your obedient servant,
William Tanner.

Newport, Mon.,
4th January 1892.

